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Factors That Influence Program Completion: Predicting Kentucky Drug Court Completion Outcomes

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FACTORS THAT INFLUENCE PROGRAM COMPLETION: PREDICTING KENTUCKY DRUG COURT COMPLETION OUTCOMES

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This dissertation, submitted by Elizabeth R. Hagensen in partial fulfillment of the requirements for the Degree of Doctor of Philosophy from the University of North Dakota, has been read by the Faculty Advisory Committee under whom the work has been done, and is hereby approved.

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Elizabeth Hagensen
July 16th, 2012

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ABSTRACT

This dissertation examines data collected from Kentucky Drug Court to determine factors associated with program completion outcomes. Extant research on drug court completion outcomes is generally limited to individual drug courts and includes small numbers of observations. This research uses more than three thousand participant records spanning over three years from all Kentucky Drug Courts. Multiple logistic regression is used to determine which factors predict program completion. Participant characteristics, problem behaviors, and drug court variables are examined. Increase in age, earning at least a high school diploma, indicating methamphetamine or other stimulant as a drug of choice, and being married are associated with an increased likelihood of graduating. Carrying a charge related to the administration of justice and receiving a sanction involving incarceration are associated with a decrease in the likelihood of graduating. Drug court variables, which included the track through which one entered drug court and the length of time the drug court was in operation, are also associated with completion outcomes; however, the addition of these variables into a multivariate model reduced overall model performance. These findings should be used with caution, as the large sample size resulted in powerful statistics, finding even very small relationships statistically significant. To more firmly identify a predictive set of factors, future studies must balance power of the statistics with the utility of the findings and also explore the complex interactions among variables.

CHAPTER I
INTRODUCTION

What society should do with the criminal population is a matter that every generation of society's leaders is called to answer. The response to this question can fall somewhere between two extremes. On one end, we recognize offenders as victims of underlying societal and personal troubles and therefore worthy of remaining a part of society because we ought to fix the underlying problem. On the other end, we define offenders by their behaviors and recognize them as criminal offenders and nothing more. Many court jurisdictions choose to approach the drug addicted offender with a specialized treatment-based program that defers a prison or jail sentence with the opportunity to remain a part of society. This program, called drug court, brings together the supervision the "criminal" warranted by his or her behaviors and the treatment the "victim" needs to alleviate the social and personal issues. Success under the drug court model is living a clean and sober life free of criminal behaviors.

Almost 30 years ago Miami-Dade Drug Court became the first treatment-based drug court in the nation (Hoffman, 2000; Whiteacre, 2008). Motivated by concerns of ineffective justice processing and system overload (Meithe et al., 2000), Miami-Dade Drug Court redesigned case processing for the drug addicted offender. The thinking behind this change was that the drug addicted and drug abusing population was a major contributing factor in overloaded dockets. The then Florida Attorney-General, Janet

Reno, believed that this particular type of offender was stuck in a revolving door in and out of the courts. If the drug addiction could be alleviated, then the criminal activities due to and in support of the addiction would cease. The goal was to reduce "substance abuse and criminal behavior while freeing the court and corrections systems to handle other cases" (National Institute of Justice, 2006, p. 1).

After the emergence of the Miami Dade Drug Court, the drug court concept gained popularity and began to spread across the country. According to the National Association of Drug Court Professionals (NADCP) (2011), the number of drug courts in operation today is estimated at more than 2,500. In some jurisdictions, drug court is further specialized into family drug courts, juvenile drug courts, and veteran drug courts (NADCP, 2011).

Drug court is a non-traditional approach to criminal supervision. The goal of drug court is to reduce the burden of drug and drug related cases on the court system by using mandated treatment and close supervision by the drug court judge (Hoffman, 2000; NADCP, 2011; NIJ, 2006). The drug court model was theorized to do this by creating a specialized caseload for drug offenders with a low risk of committing further criminal acts and with low intensity drug histories (Marlowe et al., 2006). This new case processing approach brought together criminal supervision and drug rehabilitation into a single venue to address drug addiction as the root cause of criminal behavior (NIJ, 2006). If drug addiction can be stopped, then the crime associated with the drug addiction will stop as well. The Office of Justice Program (2004) publication, titled *Defining Drug Courts: The Key Components,* serves as the guiding doctrine for the key components of drug courts. In a section titled Purpose, this document defined the mission of drug court:

"the mission of drug courts is to stop the abuse of alcohol and other drugs and related criminal activity" (p. 1).

Since the first drug court emerged in the late 1980s, the drug court movement grew, both in terms of scope and number of courts in operation. In scope, the targeted population has increasingly included offenders whose "substance abuse and criminal activity may be more serious and pose a greater threat to society…" (OJP, 2006; p. 2) than the population for which the original drug court model was formed (Leukfeld et al., 2004; Marlow et al., 2006; Miethe, Lu, & Reese, 2000; Peyton & Grosswieler, 2001). To examine the current core program requirements for drug court (frequent drug testing, frequent contacts with supervisor staff, mandated treatment, and frequent contact with the judge), one might think there is some confusion between level of supervision and level of risk if the program is targeted for low-level and low-risk drug offenders. For example, frequent contacts with justice supervision staff, either judge or probation or parole officer, frequent drug testing, geographic travel restrictions, and even curfew, were once the domain of intense supervision probation or parole type programs and reserved for the highest risk offenders. Marlowe, Festinger, Lee, Dugosh, and Benasuitti (2006), in their study of drug court participant risk and level of judicial supervision, suggest that the risk principle in drug court may be applied improperly. They assert that "intensive interventions such as drug court are believed to be best suited for offenders who are high risk and have more severe criminal propensities or drug use histories but may be ineffective or contraindicated for offenders who are low risk" (p. 54).

As drug courts grew in number, the drug court movement professionalized and national level organizations formed. In the mid 1990s, the National Association of Drug

Court Professionals formed with initial membership that included the original drug court innovators (NADCP, 2011). The National Drug Court Institute, which is concerned with research and scholarship, appeared toward the end of 1997 and publishes a bi-annual journal about drug courts. Additionally, the Congress of State Drug Court Associations formed in the latter part of the 1990s to assist in drafting legislation and securing funding at the state level. By 2007, the National Association of Drug Court Professionals recognized 2,147 drug courts in existence with an additional 3,204 other problem-solving courts (Huddleston, Marlowe, & Casebolt, 2008). As of December of 2009, there were 2,663 drug courts in operation (NADCP, 2011).

After almost 30 years in operation and the growth of drug court across the nation, the research on its effectiveness at reducing both crime and addiction remains mixed. While some research finds that drug court results in reductions in recidivism and relapse (Belenko, 2001; GAO, 2011; Gottfredson & Exsum, 2002; Spohn, Piper, Martin & Frenzel, 2001) and generates cost savings from "avoided law enforcement efforts, judicial case processing, and victimization resulting from future criminal activity" (Huddleston, Marlowe & Casebolt, 2008; p. 6), not all literature is supportive of the drug court concept. For example, Hoffman (2001) and also Cissner and Rempel (2005) argued that what drug courts do to produce reductions in recidivism and relapse is not clearly understood. Belenko (2001) and Cissner and Rempel (2005) as well as Hoffman (2000) argued that issues with data quality, small sample sizes, defining units of measure and what time frames are measured often plague the research.

Moreover, judicial commentary not supportive and highly critical of the drug court concept exists (see Boldt, 2010; King and Pasquarella, 2009; Hoffman, 2000;

Hoffman, 2001). In his law review article titled *The Drug Court Scandal* (2000), the Honorable Morris Hoffman described drug court as a "fundamentally unprincipled" (p. 14) "half-crime approach" (p. 14) that suffers from "doctrinal schizophrenia" (p. 14) and is nothing more than an "appeasement of two powerful political forces—the law enforcement community and the treatment community" (p. 13). In essence, Hoffman viewed drug court as a "political fad" (p. 39) that has lost sight of its purpose and argued that drug courts are a type of "social tinkering" (p. 14) that falls outside the scope of the judicial branch's reach. Hoffman (2000) wrote:

> …When we succumb to the very human temptation to do more—to fill the void that is so achingly apparent in so many of the dysfunctional people we see every day—we not only risk being wrong, we risk being imperial….The moral authority of our most cherished institutions comes from their voluntary nature: the value of advice from a priest, a teacher, or a loved one depends in large part on the fact that we are free to ignore it. But judges' pieces of "advice" are court orders, enforceable ultimately by the raw physical power of imprisonment. It is precisely because of the awesomely enforceable nature of our power that we must be so circumspect in exercising them. It is one thing for a co-worker, family member, doctor, or a clergyman to confront someone about a perceived drug problem; it is quite another thing for a judge to compel drug treatment. Drug courts not only fail to recognize this important institutional distinction, but their very purpose is to obliterate it (p. 15).

Concerns with jurisprudence considered, drug courts have flourished yet the field still lacks a clear understanding of exactly what works, for whom, or even why drug court

might be successful (Marlowe, DeMatteo & Festinger, 2004). Drug courts continue to grow in number, perhaps, as suggested by Hoffman (2000) because they are appealing to both law enforcement and treatment communities. Understanding what impact drug court programming has on both recidivism and relapse is imperative to understanding if drug courts work for their intended purposes and how they work. The field needs to understand the factors associated with completing the program to understand why drug courts may produce reductions in recidivism and relapse. With this knowledge drug court operators can make informed decisions to assess, improve, and manage their drug courts (Cheesmam, Rubio & VanDuisend, 2004).

The Drug Court System

At the core of the current drug court model is a fundamental change in the way the justice system operates in terms of both relationships between justice actors and roles of the justice actors. The breakdown of traditionally adversarial relationships is an important factor in the drug court model (OJP, 2006). Rather than each fulfilling their traditional role (e.g., a prosecuting attorney focused on conviction or a probation/parole officer focused on criminal supervision compliance), court room working group members come together as a team on the core premise of helping the offender begin a prosocial lifestyle. Traditional courtroom working group members come together to form a drug court team, which changes the work dynamics. Members of the drug court team can include the prosecutor, defense attorneys, probation/parole officers, treatment social workers, and even bailiffs. Under the drug court model, the prosecutor focuses less on proving guilt and more on the individual's wellbeing. Moreover, the label of "offender" is changed to "participant" or "client." Most importantly, the judge's role "is expanded to

respond to each participant's positive efforts, as well as to their noncompliance" (Hora, 2002, p. 1473) and it is this relationship that "identifies the judge's role as key to program success" (NIJ, 2006, p. 9).

Beyond breaking down adversarial roles and expanding the role of the judge, this justice supervision adds a treatment requirement and individualized program plans intended to improve participant life skills (NADCP, 2011). Drug court and treatment staff identify areas of concern (e.g., employment, education, housing, health care) and work with the offender toward those goals. Sometimes this includes helping participants divest themselves of antisocial relationships. It is not unheard of for a drug court judge to order a "drug court divorce," which is when an offender is ordered to abstain from his or her known criminal associates even if that person is a spouse, a parent, or other family member. Obtaining employment, finishing a GED, enrolling in college, completing community service, paying child support, and paying all court obligations are all important parts of a prosocial lifestyle included in drug court programming. Failing to complete a number of the tasks, which are normally not a part of criminal justice supervision, may result in a drug court sanction.

Drug Court Operations and Process

In 1997, the Drug Courts Program Office, Office of Justice Programs (OJP), published a document to establish a guiding doctrine of drug court. In most cases, drug court is operated at the local or county level. In some instances, a drug court may include multiple counties and jurisdictions, and for a few states, programs are operated under a unified state model. Local differences in resources and funding necessitates designing the drug court to fit the needs of the population and within limits of resources of the

community. As a result, a highly structured and regimented service delivery or program model does not exist. Rather, best practices were outlined and issued at a national level. Table 1 shows the key components for the drug court model. These key components stress the integration of treatment and judicial case processing and outline the fundamental elements necessary for the drug court programming to be effective.

Table 1
Drug Court Ten Key Components (OJP, 2004)

1. Drug court integrates alcohol and other drug treatment services with justice system case processing.
2. Using a non-adversarial approach, prosecution and defense counsel promote public safety while protecting participants' due process rights.
3. Eligible participants are identified early and promptly placed in drug court.
4. Drug court provides access to a continuum of alcohol, drug and other related treatment and rehabilitative services.
5. Abstinence is monitored by frequent alcohol and other drug testing.
6. A coordinated strategy governs drug court responses to participant's compliance.
7. Ongoing judicial interaction with each drug court participant is essential.
8. Monitoring and evaluation measure the achievement of drug court goals and gauge effectiveness.
9. Continuing interdisciplinary education promotes effective drug court planning, implementation, and operations.
10. Forging partnerships among drug court, public agencies, and community-based organizations generates local support and enhances drug court effectiveness.

Kentucky Drug Court

The current study examines Kentucky Drug Court, which is organized and managed at the state level, but executed locally. According to the Kentucky Drug Court mission statement (2008), their mission is the protection of public safety, the reduction of continued criminal offending, and long term positive lifestyle changes for the drug addicted offender.

The mission of the Kentucky Drug Court is to protect public safety and reduce the recidivism rate of drug-addicted offenders through an integrated approach that

involves court supervision, substance abuse treatment services, education, employment, and personal accountability, resulting in positive and long lasting life changes. (Kentucky Drug Court, 2008).

Kentucky Drug Court operates on a unified state model, which means that the state standardized certain elements across all drug courts. Each drug court is provided oversight by the Administrative Office of the Court and follows the same structured model for operations, case management, and information management. The first state-modeled drug court was in Fayette County, Lexington, Kentucky, in 1996. Since then, the drug court programs grew in number and, as of 2009, through local, state and federal funds, 115 of the 120 counties in the state are serviced by a drug court. There are 83 drug courts to cover the 115 counties throughout the state.

Entry into drug court. Defendants enter into drug court through one of four tracks: diversion, probation, contempt, or family. Regardless of the track, the process for moving a case to drug court is the same. This process consists of five steps: (1) referral to drug court, (2) an eligibility review to ensure that both the individual and the case are appropriate for drug court participation, (3) an addiction assessment to ensure the issues surrounding the addiction can be supported by drug court, and in some instances, a case-file review by a drug court panel, (4) voluntarily acceptance of participation in drug court, and then (5) initial intake upon entrance into the program.

First, a referral occurs after an arrest and can occur at any number of court-related events, such as at an initial hearing for a drug related crime, during an informal discussion with a judge, or upon the suggestion of attorneys. Referrals can also come through post-sentencing channels, such as probation hearings, or directly from a judge

during a court hearing. In any event, a referral to drug court is a formal court docketed motion set by a judge. Second, the referral is provided to drug court staff members, who then conduct an eligibility assessment. Eligibility criteria for Kentucky Drug Court are generally standardized through the state. With few exceptions, certain crimes are excluded from consideration. Offenders holding crimes of violence, sex offenses, and drug manufacturing charges are ineligible for participation. Some drug courts support both misdemeanor and felony level offenders while others accept only felony offenders. Third, once an individual is determined eligible for drug court, an addiction assessment is conducted. Kentucky Drug Court utilizes the Addiction Severity Index (ASI). The information obtained from the addiction assessment is not entered into the management information system (and therefore not available for analysis in this study). Some drug courts convene a panel or a "drug court team" to make the acceptance/rejection decision. According to senior drug court leadership (Neal, 2010), review of the participant referral by a drug court team ensures the participant level of needs and risk matches the available drug court resources. A participant's case file is generated in the management information system (MIS) when all steps in the review process are favorable to drug court participation and the individual agrees to participate.

Program requirements. Kentucky's felony drug court takes a minimum of 18 months to complete while misdemeanor drug court takes 15 months. The drug court is organized into four phases of decreasing restrictions and supervision, and increased incentives with progression through the phases. Stabilization of drug use is the goal of Phase I, which is programmed to be a minimum of 30 days. If participants enter drug court with documented clean time, such as from a treatment facility or another drug court,

this time may be reduced at the discretion of the drug court judge and staff. Phase II places emphasis upon education about recovery and beginning a prosocial life. This phase is designed to last no fewer than 240 days. Phase III is thought of as a self-motivational phase where the participants experience fewer restrictions than Phase II but are not completely free of supervision. Each drug court has a fourth phase, which most term Aftercare. Drug courts vary with regard to the components of this fourth phase, but in most programs, judicial supervision is minimal and allows participants to begin making choices for their own purposes rather than for drug court requirements.

The requirements for each phase are generally the same; however the intensity of each requirement varies by phase and individual participant need. According to the Kentucky Drug Court participant handbook, the standard requirements are as follows:

- Submit to random drug/alcohol screens
- Attend clinical and educational contacts
- Attend drug court sessions with the judge
- Obtain and/or maintain court approved full-time or full-time equivalent employment, training, or education
- Obtain and/or maintain court approved housing
- Make arrangements for payments of court obligations
- Make an individual contact with drug court staff
- Show an appropriate understanding of substance abuse treatment and recovery
- Enroll and attend a self-help program, such as a twelve-step program
- Remain drug-free for at least 30 consecutive days

In addition to the common program requirements, some drug courts may require the following:

- Obtain a twelve-step sponsor
- Submit to employment, home, school visits by drug court staff
- Attend and comply with certain types of counseling; e.g. domestic violence, anger management, money management, vocational rehabilitation,
- Submit to curfews
- Submit to geographic travel restrictions

- Comply with all medical and/or mental health referrals and/or treatment

Drug court programming is intensive, especially during this first phase, and requires a high level of commitment to continue through all four phases. Phase I requirements include a minimum of eight drug court contacts per week, three drug screens, three clinical or educational contact hours, one drug court session with the drug court judge, and one weekly contact with a case manager. Those requirements are independent of any additional elements that personalize the drug court programming (e.g., outpatient groups, mandatory issue-specific groups or twelve-step groups). Keeping track of individual requirements, ensuring adequate transportation, arranging for daycare if needed, all the while trying to remain drug and alcohol free and adjusting to a new lifestyle is daunting. The intensity of the requirements decrease as one moves through the phases, but even so, not everyone successfully completes the program. So what can drug court staff do to ensure each participant receives the support they need to increase the likelihood of graduating? Determining which factors influence a participant's completion in drug court is the knowledge gap that the current research addresses.

CHAPTER II
LITERATURE REVIEW

The National Association of Drug Court Professionals (NADCP) concludes that "…Drug Courts work. Better than jail or prison. Better than probation and treatment alone. Drug Courts significantly reduce drug use and crime and are more cost-effective than any other proven criminal justice strategy" (NADCP, 2011). However, declaring that "drug court works" may be premature. Reviews of available research (Belenko, 2001; Cissner & Rempel, 2005; Goldkamp, White, & Robinson, 2001; Shaffer et al., 2010; Turner et al., 2002) point to methodological shortcomings, including a lack of statistical rigor and generalizability and also inadequate data quality and quantity that interfere with a firm conclusion about the effectiveness of the drug court program.

Recidivism

The literature on drug court outcomes suggests that drug courts may produce moderate reductions in criminal activity both during program participation and after program completion (Belenko, 2001). The Government Accountability Office (GAO) (2011), in a report that summarized findings from reviews of drug courts that received federal grants, concluded that drug court participants were rearrested less than comparison groups by a rate of six to 26 percentage points. Beyond this recent finding, obtaining an actual measure of drug court's effect on recidivism is problematic, as there is no standard definition of recidivism among drug court outcome studies. Recidivism can be measured as new arrests (Belenko, 2001; Gottfredson & Exum, 2002; Roman,

Townsend & Bhati, 2003; Spohn et al, 2001), new convictions (Spohn et al., 2001), or even new court appearances (Miethe et al., 2000). Moreover, the timeframe in which the recidivism is measured also varies. Recidivism can be measured during program participation (Belenko, 2001; Gottfredson & Exum, 2002), post program completion (Miethe et al., 2000; Spohn et al., 2001), or measured in terms of time to recidivism (Spohn et al., 2001).

The Spohn et al. (2001) study presented the most comprehensive look across all these different methods for measuring recidivism. This study, titled *Drug Courts and Recidivism: The Results of an Evaluation Using Two Comparison Groups and Multiple Indictors of Recidivism*, matched drug court participants (N = 285) to traditionally processed offenders (N = 194), and offenders assigned to a diversion program (N = 232). Spohn et al. (2001) included 12 different measures of recidivism, in which drug court participants consistently performed better than traditionally processed felony drug offenders. However, when compared to the diversion group, drug court participants consistently performed worse. For example, 42.1% of the drug court group was rearrested during the 12 month follow-up period, whereas 60.8% of the traditionally processed felony offender group and 28.9% of the diversion group experienced rearrest. The drug court group showed "substantially fewer total arrests than the traditionally adjudicated offenders" (p. 160), but more than two times the number of total arrests than the diversion group. However, once level of risk was considered, the differences between drug court and diversion program disappeared while differences between traditionally processed offenders and drug court remained. These results led the authors to conclude that "drug court is an effective intervention" (p. 171). The authors suggested "that the

substance abuse treatment and intensive judicial supervision offered through the drug court is effective in preventing or delaying a return to substance abuse and criminal behavior" (p. 171).

Gottfredson and Exum (2002) conducted a quasi-experimental and randomized design between Baltimore Drug Treatment Court and traditional probation/parole services. This study followed 235 participants through the first year of their participation in either the drug court program or traditional case processing. They found a 16% reduction in rearrest for drug court participants at one year following assignment in the study. Moreover, the frequency of new arrests and new charges for drug court participants were also significantly reduced. Drug court participants showed an average number of rearrests of 0.9 and an average of 1.6 new charges while the traditionally processed offenders showed an average of 1.3 rearrests and 2.4 new charges. This suggests that drug court participants are less likely to experience any new arrest than the traditionally processed offenders and when a new arrest occurs, drug court participants receive significantly fewer charges.

A different report by Roman, Townsend, and Bhati (2003) provided a "general estimate of recidivism among a nationally representative sample" (p. 1) of more than 2,000 drug court graduates from 95 drug courts. The authors found that the one-year post graduation recidivism rate was 16.4% and the two-year post graduation recidivism rate almost doubled to 27.5%. However, this study did not include any comparison group, so the meaning of these findings in relation to other correctional programs, such as probation or parole or other traditionally type of case processing, was left unexamined. Additionally, this report defined recidivism as "any arrest for a serious offense resulting

in the filing of a charge" (p. 1). By this definition, arrests that do not result in the filing of a charge are excluded. This definition appears narrowly focused on court case processing rather than the phenomenon of rearrest as used in the Spohn et. al (2001) and the Gottfredson and Exum (2002) studies.

Another issue with understanding drug court's effect on post-program recidivism is that most other evaluation studies do not include post-program recidivism, and of those that do, not all apply statistically rigorous methods. Belenko (2001) in his "critical review of 37 published and unpublished evaluations of drug court" (p. 1) found that only six of these 37 studies included analyses of post program recidivism. Of those six studies, four found lower rates of recidivism, but only two of those four studies included test of statistical significance. One study that applied tests of statistical significance found lower rates of recidivism for drug court participants, but the difference was not statistically significant. The remaining study Belenko reviewed found a statistically significant increase in recidivism rates for drug court participants. This study (Miethe el al., 2000) is discussed below.

Miethe et al. (2000) reviewed the Las Vegas Drug Court and explored the theory of reintegrative shaming as it applied to the drug court context. In this study, the authors gathered arrest records and conducted courtroom observations on both drug court and non-drug court drug-related offenders. Recidivism for this study is defined as subsequent court appearances for an offense during 1997 in Clark County, Nevada. They found that drug court participants' (N = 301) recidivism rates were 10 percent higher than a control group's (N = 301). The drug court group showed a recidivism rate of 26% whereas the control group showed 16%. The authors suggested that higher recidivism rates for this

particular drug court may, in fact, show that drug court sessions may be stigmatizing rather than reintegrative in orientation. This conclusion is based on a "wide disparity between its organizational rhetoric and actual practices" (p 536) noted from three months worth of courtroom observations and interviews with drug court participants. The authors cited three main reasons this particular drug court experienced an increased risk of post-program recidivism: the fact that drug court sessions with the judge served as a public degradation ceremony, the failure of drug court staff to follow through with reintegrative efforts post-graduation, and the failure to "increase offenders' embeddedness in social institutions and interdependencies through repeated contact with court officials, and in particular the judge…" (p. 538).

Relapse

Studies examining drug court's effect on relapse are sparse. Relapse generally refers to a return to drug use, but, similar to the problem with the definition of recidivism, exactly how to measure a return to drug use is problematic. Cissner and Rempel (2005) suggest that this may be "primarily due to the inherent difficulties in locating both drug court participants and comparison group membership for follow-up interviews and urinalysis testing" (p. 6).

Although infrequent, studies that examine the relationship between drug court and relapse generally find that drug court produced reductions in drug use. For example, the Government Accountability Office (2011), in a review of 32 drug court evaluations and 11 cost-benefit studies from federally funded drug courts, found that "drug-court program participants were less likely than comparison group members to use drugs" (p.

1) citing 56% of drug court graduates compared to 76% for non-drug court graduates. This report examined both self-reported drug use and positive urinalysis results.

Another study, Gottfredson et al. (2005), in a continuation of their quasi-experimental design to study Baltimore City Drug Court, relied on self-reported drug use as an indicator of relapse. These authors used a variety of tracking mechanisms and located 72% of study participants for a three-year post completion assessment. Researchers conducted follow up interviews with 157 study participants. Relying upon self-reported drug use scales, these authors concluded that drug court participants rated lower on substance abuse and addiction measures than the traditionally processed offenders. Specifically, drug court participants used fewer kinds of drugs, scored lower on both alcohol addiction and drug addiction severity scales, and reported less cocaine use. However, caution with these findings is warranted as the authors relied upon self-disclosure of drug use behaviors to gauge relapse rather than drug screens. Using self-disclosure as a method for determining drug use could be a challenge for researchers as study participants may not be truthful about their drug use, especially if study participants are embarrassed about a return to drug use and fear being viewed as failures.

Program Completion Outcomes

Post program completion research suggests that drug court may produce reductions in recidivism and relapse, but tells us little about the characteristics of those who complete the program. As researchers try to answer questions about how and if drug courts work, an understanding of who successfully completes and who fails to successfully complete the program is necessary. If studies used to determine the impact

of drug court rely upon drug court graduates, then it is necessary to understand if there are predictable differences between those who graduate drug court and those who do not.

Of the available research specifically on drug court completion outcomes, this review of literature focused on 14 key studies directly exploring program completion outcomes, Belenko's review of 37 drug court evaluations, and other studies that indirectly explore drug court outcomes. See Table 2 in this literature review and Table A1 in Appendix A for a details on the 14 key studies.

In general, these studies find that general criminogenic factors may play a role in program completion outcomes, but, at times, show mixed and sometimes contradictory findings. For example, age is often found to be related to completion outcomes. One study found that younger participants experienced increased odds of graduation (Senjo & Leip, 2001a), while another study found that older participants were more likely to graduate (Hepburn & Harvey, 2007). So, we may be able to say that certain factors, age for example, are predictive of completion outcomes, but we don't know exactly how the factors impact completion outcomes because the effects vary across studies. Moreover, some authors found that the ability to predict program outcomes is limited because of interaction effects among variables. The discrepancies across studies may be due to differences in populations under study, variable definitions, locations, or even timeframes of study. The following sections provide an in-depth look at variables commonly included in drug court program completion studies.

Table 2
Key Studies

Author	*Year*	*Study Comparisons*	*Sample Design*	*N*	*Location*	*Method Used*
Anspach, Ferguson & Phillips	2004	Part of larger evaluation; Graduates vs. non-graduates	Not described (assumed all)	191	Statewide, Maine	Path Analysis
Boles et al.	2007	Drug court vs. standard services	Not described (assumed all)	684	Sacramento, CA	Bivariate Logistic and Linear regression
Butzin, Saum & Scarpetti	2007	Drug court vs. standard services	Not described (assumed all)	116	New Castle County, Delaware	Bivariate, Logistic regression
Evans, Li & Hser	2009	Graduates vs. non-graduates	Multi stage: Purposeful geographic selection; followed by undescribed type of random selection	926	Statewide, California	Bivariate, Logistic regression
Hepburn & Harvey	2007	Track 1 vs. Track 2 (Mode entry)	All	510	Maricopa County, AZ	Bivariate, Logistic regression
Hickert, Boyle, & Tollefeson	2009	Graduates vs. non-graduates	Not described (assumed all)	288	Salt Lake City, UT	Bivariate logistic regression (enter, forward, backward)
Hiller, Knight & Simpson	1999	Graduates vs. non-graduates	Not described (assumed all)	326	Dallas County, TX	Bivariate logistic regression (stepwise)
Marlowe et al.	2003	Bi-weekly vs as needed groups (status hearings)	All, solicited all new misdemeanor participants to participate in study; followed by random assignment to groups	197	Wilmington, DE	ANOVA, chi-square, GEE
Mullaney & Peat	2008	Part of evaluation; Graduates vs. non-graduates	Random sample, 50 cases from each year	241	Undisclosed "County Adult Drug Court"	Percent, count

Table 2 *(continued)*

Author	*Year*	*Study Comparisons*	*Sample Design*	*N*	*Location*	*Method Used*
Peters, Haas & Murrin	1999	Graduates vs. non-graduates	All	95	Escambia County, FL	Cox regression (forward stepwise)
Schiff & Terry	1997	Graduates vs. non-graduates	All drug court admissions from first year of operation; those who agreed to participate in study	418	Broward County, FL	Bivariate, Logistic regression
Sechrest & Shicor	2008	Graduates vs. non-graduates	All	102	Riverside County, CA	Bivariates
Senjo & Leip	2001	Graduates vs. non-graduates	Systematic random sampling of recovery center records	100	Broward County, FL	Bivariate, Logistic regression
Shaffer et al.	2010	Graduates vs. non-graduates	All	302	Akron, OH	Bivariate, Logistic regression

Participant Characteristics

Sex. Most of the studies reviewed here find no difference between men and women on program completion outcomes (Evans, Li & Hser, 2009; Hepburn & Harvey, 2007; Marlowe et al., 2003; Mullaney & Peat, 2008; Sechrest & Shicor, 2008; Senjo & Leip, 2001b). In a review of eight drug court programs, Belenko (2001) observed that in some studies, women show more positive outcomes while other studies show evidence that men are more likely to complete. These differences were expressed through the use of descriptive statistics, leaving no indication if these findings were statistically significant.

One line of thought about sex differences in completion outcomes is that women have a more difficult time successfully completing drug court than men because women

are more likely than men to experience gender-specific issues that interfere with their ability to meet drug court requirements (Neal, 2010). For example, Neal discussed that, in Kentucky Drug Court, she observed that women are more likely than men to be the primary caregiver of minor children. Care giving may pose difficulties in making necessary arrangements to meet the rigors of drug court programming.

Studies find that sex interacts with other variables of study commonly included in drug court outcome studies. Belenko (2001) observed sex differences with regard to drug of choice, with males significantly more likely to indicate a preference for cocaine, alcohol, or marijuana than females. Shaffer et al. (2010), in a study of drugs of choice, arrived at this same finding. Some studies (Hickert, Boyle & Tollefson, 2009; Hiller, Knight, & Simpson, 1999) found that harder drugs, such as cocaine, and alcohol, were negatively related to completion outcomes. This suggests that sex may influence program completion as an interaction with other variables.

Age. Evidence for the influence of age on program completion outcomes is also not consistent enough to draw a general conclusion. A number of studies (DeMatteo et al., 2009; Hepburn & Harvey, 2007; Shaffer et al., 2010) found that age is not related to completion outcomes. In contrast, other studies found that age is a significant predictor but within these studies the directionality may differ. For example, Senjo and Leip (2001a) found that older participants were less likely to graduate. Other studies (Cissner & Rempel, 2005; Hickert, Boyle & Tollefson, 2009; Young and Belenko, 2002) found that the likelihood of graduation increased with age. One study, Hepburn and Harvey (2007), found that increased age was a significant factor in longevity in the program at 90

days retention, only to be dropped from significance at 180 days retention and not related to successful program completion.

Similar to the situation with sex, some studies found that age interacted with other drug court and offender characteristics (Shaffer et al., 2010; Hepburn & Harvey, 2007; Rempel & DeStefano, 2001). Several studies found an interaction between age and drugs. When comparing alcohol and marijuana users, one study found that those with alcohol as their drug of choice were more likely to graduate than those listing marijuana, but marijuana users tended to be younger (Shaffer et al., 2010). In modeling for completion outcomes, Rempel and DeStefano (2001) found that age moderated the effects of race on program completion. This study found "that black participants [were] significantly older and Latino participants significantly younger than average" (p. 106). In effect, age may hold both direct and indirect influence on program completion outcomes.

Race. Findings from studies exploring race and program completion are mixed, but generally find more positive completion outcomes for whites when compared to other racial groups. A number of studies showed that whites experience higher graduation rates than non-whites (Belenko, 2001; Hepburn & Harvey, 2007; Schiff & Terry, 1997; Senjo & Leip, 2001a, 2001b). One of those studies (Senjo & Liep, 2001a) found that race was the best predictor of program completion. Caution is warranted in assuming a direct effect between race and successful program completion. Belenko (2001) acknowledged that race can be a factor that influences program outcomes; however, he suggested that these differences can be accounted for by other factors such as employment and drug of choice, or with age as discussed earlier. Belenko (2001) discussed this interaction in the

context of the Roanoke, Virginia, drug court. The Roanoke, Virginia drug court found that race was related to completion outcomes. Belenko speculated, but did not test, that this observation could be accounted for by the fact that non-whites also had lower employment rates than whites. Dannerbeck et al. (2006) found that race and drugs of choice were related in that African Americans were more likely to report use of cocaine and cocaine use was associated with a lower likelihood of graduating. Contrary to these findings, many studies found no significant relationship between race and program completion outcomes (Evans et al., 2009; Peters, Haas & Murrin, 1999). Although the majority of studies reviewed here find that whites show more positive completion outcomes, many studies also find interactions between race and other variables causing a lack of firm conclusions about the relationship to completion outcomes.

Marital status. The majority of research that explored marital status found that marital status has little influence on drug court completion outcomes; however, Hepburn and Harvey (2007) found that marital status was associated with an increased likelihood of retention at 90 days, although this relationship disappeared at 180 days retention and was not associated with completion status. Other studies found no relationship between marital status and drug court completion (Shaffer et al., 2010; Mullany & Peat, 2008; Senjo & Leip, 2001a; DeMatteo et al., 2009; Hiller, Knight, & Simpson, 1999).

Current criminological theory may provide some support for understanding this factor. In theory, marriage could either help or hinder a participant's progress toward completion. In routine activity theory (Cohen and Felson, 1979), a spouse may function as a protective factor, preventing deviance from program rules by serving as a capable guardian or handler. Another way to explain a positive social impact from a significant

other is suggested by theories of informal social controls (Hirschi, 1969; Sampson & Laub, 1993). A spouse may be a person whom the participant looks up to and admires, and whose opinion is valued. Participants are therefore constrained from committing acts that threaten successful program completion due to the bond with their spouse. If this were the case, then marriage may increase the likelihood of graduation.

However, this same relationship, if the spouse is also criminal or deviant, could serve negatively to impact drug court outcomes as suggested by Sutherland's differential association theory (1937) and Akers' (1985) social learning theory. In this view, the spouse may promote definitions of acceptable behavior as those that violate program rules.

Employment. Employment as a predictor of drug court program completion also lacks consistency within the literature, and fails to be included as a regular variable of interest (Senjo & Leip, 2001b). Studies that examined employment found that employment increases the likelihood of graduation (Belenko, 2001; Hickert et al., 2009; Shaffer et al., 2010; Mullany & Peat, 2008; Roll, Prendergast, Richardson, Burdon & Ramirez, 2005). One study (Roll et. al., 2005) found that employment increased graduation fourteen-fold. Evans, Li, and Hser (2009) found that employment problems at the time of intake decreased the likelihood of graduation. Similarly, Hiller, Knight, and Simpson (1999) found that unemployment within 30 days of adjudication to the treatment program was associated with program dropout. Other studies, however, found that employment was not related to program completion, but these studies cited limitations from lack of variance or severely unequal group sizes (Rempel & DeStefano, 2001; Sechrest & Shicor, 2001). For example, Hickert et al. (2009) discovered that employment

predicted successful completion in bivariate analysis, but failed to predict in multivariate analysis. The authors suggested that lack of variation, meaning high rate of unemployment across the entire sample, could account for this finding.

Employment is also found to interact with other variables. Hepburn and Harvey (2007) found that employment interacted with other individual level characteristics to produce a greater likelihood of successful completion. Specifically, they found that employed participants who were married and obtained at least a high school diploma were more likely to experience positive outcomes than the converse.

Theoretically, the influence of employment on program completion outcomes could be either positive or negative. The rigors of drug court are intense and require persistence and dedication to meet all the requirements. Anything that interferes with meeting these requirements may negatively influence completion outcomes. This includes fitting drug court around a work schedule or vice versa. Drug court programming requires frequent drug testing, sessions with drug court staff and sessions with the judge; all of which may require a flexible work schedule. If an employer is not accommodating, a participant may have trouble meeting these requirements. On the other hand, employment may serve as a protective factor. If an employer is supportive of drug court participation, then holding a job may increase the likelihood of graduation. In this scenario, social control theories (Hirschi, 1969; Sampson & Laub, 1993) might suggest that a participant seeks to comply with requirements to ensure the relationship with the employer is not jeopardized. Another issue to consider is that if employment is a program requirement, then maintaining employment is a necessary condition of graduation (i.e.,

with participants required to attain or maintain employment). This would result in naturally higher rates of graduation for those indicating any sort of employment.

Education. Level of educational attainment, although not always included in drug court studies, demonstrates a positive relationship with drug court performance (DeMatteo et al., 2009; Shaffer et al., 2010; Mullany & Peat, 2008; Schiff & Terry, 1997). Hickert et al. (2009) found a 15% increase in likelihood of graduation for every increase in grade level. Even when measured dichotomously (i.e. not graduated, graduated high school), graduation from high school demonstrated a positive influence on completion rates (Hepburn & Harvey, 2007; Hickert et al., 2009). Other studies (Senjo and Leip, 2001a; Hepburn & Harvey, 2007; Hiller et al., 1999), on the other hand, found that education was not a significant predictor of graduation.

Similar to previously mentioned variables of interest, education shows interaction effects with other commonly included variables of study. Shaffer et al. (2010) found statistically significant differences between drugs of choice (crack/cocaine, marijuana, and alcohol) and education level, and showed that those who completed high school were more likely to prefer alcohol.

Mental illness. Research on mental illness and drug court completion is less prevalent than research on other individual level characteristics. The presence of any type of mental illness is not a commonly included variable of study. In the literature that includes mental illness as a variable of study, the relationship between mental illness and program completion is mixed. Cissner and Rempel (2005) found that those without a diagnosed mental illness are more likely to graduate than those with a dual diagnosis. Hickert et al. (2009) found that depression is associated with an increased probability of

dropout. Evans et al. (2009) showed that psychiatric conditions, as defined by the Addiction Severity Index, were more prevalent among dropouts. Hiller et al. (1999) found that the presence of depression, anxiety, and hostility was associated with program dropout. To the contrary, other studies found no relationship between mental illness and outcomes. In a study that used positive drug screens as a measure of drug court performance, DeMatteo et al. (2009) found that antisocial personality disorder did not differentiate between types of drug court performers (optimal performers, responders, non-responders, and the noncompliant). Moreover, Cosden et al. (2006) found that psychological problems had no significant impact on program completion. More studies are needed on the relationship between mental illness and program completion.

Family and social supports. The role of family and social supports in drug court completion outcomes is also relatively unexamined. However, those studies examining these aspects found certain elements of a participant's social setting matter for drug court performance. Hickert et al. (2009) observed that participants whose free time is mostly spent around their family are significantly less likely to dropout than those who spend time with their friends or alone. Additionally, they found that caring for children did not appear to have any influence on likelihood for graduation, but those living alone and those living in socially isolated neighborhoods are less likely to graduate. Conflicting with that finding on social isolation, Rempel and DeStefano (2001) found that social isolation was not significantly related to program outcomes. Remepl and DeStefano found that general social connectedness, measured in terms of having a stable residence, being employed, or in school at the time of intake, positively influenced program retention and completion. This concept, not unlike Sampson and Laub's theory on

informal social controls (1993), suggests that social interactions can be protective factors. On the other hand, support for a learning model also exists, which suggests that not all social interactions are protective in nature. Possessing a deviant peer network was shown to predict program dropout (Hiller et al., 1999). In this case, although a participant is socially connected, the antisocial peer influence decreased the likelihood of program completion.

Problem Behaviors

Drugs. Drug of choice's impact on program completion is not firmly established in the literature, but harder drugs such as cocaine and heroin are generally found to negatively impact program completion (Hickert et al., 2009). Findings for other substances, such as marijuana and alcohol, vary by study. For example, marijuana or cocaine have shown a negative effect on graduation outcomes (Belenko, 2001; Hickert et al., 2009; Hiller et al., 1999; Shaffer et al., 2010), and program dropout was predicted by cocaine dependence (Belenko, 2001; Hiller et al., 1999; Saum, Scarpitti, & Robbins, 2001; Taxman & Bouffard, 2002). Hiller et al. (1999) found no difference between dropouts and completers for alcohol, opioids, and marijuana. Shaffer et al. (2010) failed to find support for a hypothesis that crack/cocaine preference was negatively related to graduation. Hickert et al. (2009) observed that indicating a stimulant as a drug of choice resulted in a decreased likelihood of successful program completion.

An issue central in determining factors related to program outcomes is that drug of choice is also found to be related to other factors including age, risk level, and race. In their study of the influence of drug of choice on program completion, Shaffer et al. (2010) found that when comparing alcohol and marijuana users, those with alcohol as

their drug of choice were more likely to graduate than those listing marijuana; however, this relationship disappeared after controlling for factors such as level of risk. Drug of choice was shown to interact with factors such as age, level of risk, and employment. Level of risk was the only factor significantly related to the program outcomes in multivariate logistic regression. The authors used the Level of Service Inventory-Revised (LSI-R) as a composite risk score, and found that the majority of alcohol abusers were identified as low risk, while the majority of marijuana and crack/cocaine users' risk levels were higher. However, another study (Dannerbeck et al., 2006) found a significant relationship between race and drug of choice: African Americans were more likely to be cocaine users, and cocaine use was associated with non-completion.

Crime. Criminal history is found to be related to both program completion outcomes and post program outcomes. A common finding, for example, is that the more extensive the criminal history, the more likely the participant is to drop out of drug court programming (Evans et al., 2009; Hickert et al., 2009; Mullany & Peat, 2008). Using the Lifestyle Criminality Screening Form (LCSF), Hiller et al. (1999) demonstrated that dropout is associated with higher scores on a criminality classification index. Other studies found that the amount of prior jail time predicted program completion (Caulkins & Chandler, 2006; Cosden et al., 2006). Cissner and Rempel (2005) observed that those with no prior criminal record are more likely to graduate than those with a prior criminal record. Hickert et al. (2009) found that receiving additional criminal charges prior to intake is associated with dropout. In a similar vein, Evan et al. (2009) observed that, within 30 days prior to assessment for program participation, dropouts experienced arrest more frequently than those successfully completing the program. These studies, when

taken together, suggest that those with heavier involvement in the criminal lifestyle are less likely to complete drug court programming.

Criminal history is also shown to be related to other variables of interest. The most prevalent interaction with criminal history appears to be drug of choice. Stoops, Staton, Mateyoke-Scrivner and Leukefeld (2005) found that criminal behavior interacted with drugs of choice. In this study, methamphetamine users were significantly more likely to report stealing, selling, or buying items worth more than $50 and less likely to report weapon charges, violations of probation, or charges of non-support than participants not indicating methamphetamine use.

Shaffer et al. (2010) also showed that criminal history interacts with drug of choice. These authors found that participants who indicated crack/cocaine as the most problematic drug demonstrated, on average, significantly more felony arrests than those indicating alcohol. Similarly, Senjo and Leip (2001a) found that participants charged with a cocaine drug crime experienced poorer completion outcomes than those not charged with a cocaine related offense. In this case, the only charge examined was any drug charge related to cocaine. This left all other drug-charge types unexamined. Two studies, Sechrest and Shicor (2008) and Shaffer et al. (2010), found no differences regarding charge type when charge was defined in terms of drug sale or drug possession. Note that this definition did not include the drug associated with the charge as the Senjo and Leip (2001a) study did. This leads to questions about possible interaction effects between drug of choice and charge type. Shaffer et al. (2010) also explored the impact of drug of choice and included prior charge information in terms of the mean number of prior felonies and mean number of prior misdemeanors, and mean number of prior

juvenile arrests. They found that those who preferred cocaine showed significantly more felony arrests than those who preferred marijuana, and that those who preferred marijuana had a significantly higher number of juvenile arrests.

When considered as a whole, charge type, criminal history, and drug of choice appear to be wrapped around each other as a product of risk. It appears that participants with involvement in the criminal justice system at a young age, those with prior felony arrests, and those with arrests involving drugs, specifically cocaine or crack, show increased likelihood of poor program outcomes. This suggests that participants who are heavily involved in the criminal lifestyle or involved for extended periods of time are less amenable to drug court programming. Considering that drug court was originally intended as a low-risk, diversionary program, but has evolved to include higher risk and post-convictions offenders, these findings are not surprising.

Sanctions. The impact of receiving sanctions on drug court completion outcomes is relatively unstudied, and of those studies that address the relationship between sanctions and completion outcomes, the findings are inconsistent and sometimes contradictory. Belenko (2001), after a review of multiple program evaluation studies, concluded that not receiving jail sanctions was significantly related to positive completion outcomes. This may suggest that sending a participant to jail as punishment was not helpful in producing desired outcomes. On the other hand, Goldkamp et al. (2001) found that the use of jail sanctions was not associated with either an increase or decrease in graduation, suggesting that jail sanctions are neither hurtful or helpful toward program completion. Marlow et al. (2004) and Cissner and Rempel (2005) found that

drug court participants who stay in treatment longer show more positive drug court completion outcomes.

One study, Anspach et al. (2004), found that sanctions interacted with other individual and drug court variables including receiving rewards. In this statewide evaluation of Maine Drug Court, sanctions were identified as an intervening variable between taking prescription medications and program graduation. Using a path analysis technique, this study showed that participants "taking prescription medications are more likely to receive" (p. 23) incarceration as a sanction and participants who received an incarceration sanction were significantly less likely to graduate. They also found that sanctions interact with rewards. As the number of rewards increased, the odds of a jail sanction decreased, which increased the likelihood of graduation (Anspach et al., 2004).

At least theoretically, sanctions may impact completion outcomes in either direction. Deterrence theory suggests that sanctions or the threat of sanctions should deter non-compliance. A labeling perspective suggests that a jail sanction may serve to increase the likelihood of further non-compliance and eventually lead to program termination. Brown et al. (2010) found that receiving a jail sanction within the first 30 days of treatment predicted treatment dropout, and Anspach (2004) found that receiving more jail sanctions decreased the likelihood of graduation.

The manner in which sanctions are applied may also be of concern. How, when, how often, and why sanctions are issued are a matter of program operations and staff discretion, which may be a reason why these factors are not well documented. Neal (2010), a senior Kentucky Drug Court administrator, suggested that a judge's views about justice and punishment may influence the use of incarceration and the use of alternative

sanctions. If correct, attempting to gauge the impact sanctions have on completion outcomes will be confounded by factors associated with the drug court judge. This means that a judge's view on the role of punishment is intertwined with the use and type of sanction. This equally applies to drug court staff since they often recommend sanctions to the judge. To point, some judges may be more likely to apply traditional sanctions while other judges may be more willing to use non-traditional or creative sanctions. Anecdotal stories from Kentucky Drug Court staff about creative sanctions include horse stall cleaning, local animal shelter duty, roadside garbage clean up, repainting drug court office walls, and community landscaping projects. Sanctioning preferences of drug court judges and how sanctioning style influences drug court outcomes needs to be studied further to draw firm conclusions.

Drug Court Variables

An unavoidable problem with drug court research is an inability to generalize results. The problem stems from different operating environments and variations in the delivery of services within and between drug courts. Each drug court operates within a community context, and each community possesses different political environments, key leadership, and service options. There is no standardized programming for drug courts across the United States. The lack of standardized operations translates into a wide variation in programming components, and type and intensity of components among drug courts (Cissner & Rempel, 2005; Marlow et al., 2004). Therefore, generalizing from one drug court to the next is problematic.

Status hearings. Drug court status hearings appear to play a role in program completion, but the relationship may not be as clear as some of the individual level

variables discussed previously. Belenko (2001) and Goldkamp, White, and Robinson (2001) found that an increased number of court appearances, also called status hearings in some locations, are associated with an increased probability of graduation. The more one attends court, the higher the probability of graduation. However, Cissner and Rempel (2005) suggested that the context of the hearing may also play an important role. They found that status hearings with positive feedback from the judge increased program retention significantly more than status hearings with fewer instances of positive feedback. Marlowe et al. (2006) found that status hearings, when matched with client risk, have a positive impact on graduation outcomes. This suggests that frequent contact with the judge may not be necessary for everyone; that those with less risk may perform well with few contacts.

Rewards and positive comments during status hearings appear to also play a role in program outcomes. As described previously in this literature review, in drug court, the judge's role is expanded to include oversight of positive performance, not just negative. A judge may issue a positive remark or tangible reward/award for good performance. Anspach, Ferguson and Phillips (2004) found that rewards, which were often issued in status hearings, are positively related to the odds of graduation. In this study, participants identified as high risk on the LSIR were shown to have better graduation rates when assigned to bi-weekly status hearings with the judge.

Treatment. A drug court's influence on treatment outcomes and the effect of treatment on drug court outcomes is worthy of much study. Prior studies on drug court and treatment found that participation in drug court increases the amount of time a client remains in drug treatment and also found that the more time a client spends in treatment

the more likely a positive treatment outcome (Cissner & Rempel, 2005; Marlow et al. 2004;). These findings suggested that judicial supervision may increase the likelihood of a positive treatment outcome. Other related studies found that drug court participants stay in community-based treatment longer than those in treatment who are under a traditional probation model (Belenko, 2001; Marlow et al., 2004). A consistent finding across drug court research was that drug court participants experience in-program relapse less frequently than traditional probation and parole (Belenko, 2001; Gottfredson & Exum, 2002; Marlow et al., 2004). Receiving treatment during the first year of drug court increased the odds of graduation (Goldkamp et al., 2001) and attendance in treatment within the first 30 days of program participation increased the chance of graduation (Cissner & Rempel, 2005). These findings suggest that getting into treatment, getting into treatment early, and staying in treatment may increase the likelihood of graduation.

However, exploring the relationship between treatment and drug court completion outcomes may not be straightforward because motivation for treatment may also matter. One study, Evans, Li, and Hser (2009), found that overall low motivation in treatment is associated with lower likelihood of drug court graduation. Specifically, the authors found that low levels of desire for help and readiness for treatment are significantly related to program dropout. Simply sitting time in treatment may not be sufficient to produce a positive influence on completion outcomes. Rather, participants need motivation and readiness for treatment.

Time in operation. Another factor to consider when exploring completion outcomes is the length of time a drug court has been in operation (Belenko, 2001). Belenko noted that in one drug court, Polk County, Iowa, evaluators observed graduation

rates increase after two years in operation; while in another study on the Orange County, California, drug court showed a slight decrease in graduation rates after the first two years of operation. Either of these findings could be the result of a number of factors, such as drug court staff establishing a working rhythm, increased community support and community resources, or even changes in judicial leadership for the drug court. As a result, Belenko (2001) urged caution when examining or evaluating drug courts in early implementation phases.

Summary of Literature Review

Some authors appear to be comfortable stating that drug courts work at reducing recidivism and relapse better than traditional correctional sanctions (see Marlow et al., 2004 for discussion), but exactly who makes it through the program, and how this relates to post program outcome studies is relatively unknown. The literature on correlates of drug court completion outcomes is focused in two inter-related areas: individual-level characteristics and program-level characteristics. Correlates of program termination or graduation do not appear to differ from traditional correlates of crime. Drug court completion correlates include sex, age, race, marital status, employment, education, drug of choice, criminal history, sanctions, and to a lesser extent mental health status, family and social supports, and certain program-level characteristics, such as length of time a program is in operation.

In this literature review, a number of methodological and operational factors were shown to interfere with forming a definitive answer about which factors most influence completion outcomes. First, interaction effects are noted among factors that the literature shows are associated with program completion. What works, for whom, and under what

circumstances has yet to be determined (Goldkamp et al., 2001). Second, wide variation in the operations among drug courts exists making comparisons difficult. Several prominent authors (see Belenko, 2001; Marlow et al., 2004) take care to note that findings from one drug court cannot be generalized to all drug courts or used to drawn inferences to other drug courts. And lastly, the effect of program-level characteristics on individual-level characteristics, and vice versa, is not well studied.

Review of Existing Outcome Methodology

To determine which factors influence drug court completion outcomes, researchers use a variety of methods. Outcome measures generally center on completion status as a binary outcome, which is typically some expression of graduation and termination. After a review of the literature, the most common analytical strategy used to explore completion outcomes beyond descriptive statistics is logistic regression. Logistic regression is the desired statistical method for this type of outcome-based study as it regresses an independent variable on a binary dependent variable to produce an estimate of the odds, or "the relative probability of falling into one of two categories" (Menard, 1995).

Other statistical techniques center on testing group differences. These methods include chi-square (Boles, Young, Moore & DiPirro-Beard, 2007; Butzin, Saum & Scarpitti, 2002; Evans et al., 2009; Peters, Haas, & Murrin, 1999) which was used to determine if significant differences exists between attributes in categorical variables. Cluster analysis (DeMatteo et a., 2009) was used to type subclasses of drug abusers while t-tests (Evans et al., 2009; Shaffer et al., 2010) and ANOVA (Boles et al, 2007; Shaffer et al, 2010; Gottfredson and Exum, 2002; Evans et al., 2009) were used to determine if

differences between groups existed. Correlation techniques were also employed in select studies (Cosden et al., 2006; Hiller et al., 1999) to measure the extent of relationships with a binary outcome variable. Cosden et al. (2006) and Hiller et al. (1999) used Pearson correlations techniques on the binary outcome variable for univariate descriptive analysis to determine suitability for the multivariate model.

Another method for studying completion outcomes included the use of a cluster analysis technique to develop typologies of drug abusers within drug court (DeMatteo et al., 2009). These authors classified drug offenders into "types" of drug abusers. The authors believed that a subgroup of offenders existed who reach abstinence early in programming and remain abstinent thereafter. They suggested that classifying drug users into "types" was important for targeting resources in an informed capacity rather than blanketing all participants with restrictive programming. The authors found support for a typology of drug abusers. Within their typology of drug abusers, one group, the "optimal performers," showed significantly higher graduation rates than the other clusters. The types were optimal performers, or those with consistently drug-free screens, responders, or those who started out with positive drug tests but became clean shortly after entering the program, non responders, or those with persistently positive drug screens with no improvement, and the noncompliant, meaning those who frequently fail to even complete the drug screens. The authors suggested that these optimal performers would have also been successful with less intense and less costly supervision methods.

Anspach et al. (2004) used path analysis to explore completion outcomes. This evaluation study on Maine's drug court used a path analysis to "differentiate clients who successfully completed these drug court programs from those clients who were expelled."

(p. 23), but only reported the results of the program elements concerning compliance, rewards, and taking prescriptions (Anspach et al., 2004). Path analysis was chosen, according to the authors, because it allowed for the control of both cause and effect variables, as well as intervening and mediating variables.

Studies using the logistic regression method generally begin the analysis with bivariate correlations to determine which variables perform well enough to contribute to model performance. Hosmer and Lemeshow (2010) argue that this is an acceptable technique for this type of modeling effort involving a binary outcome as removing unproductive variables reduces noise within the model and therefore increases the overall model accuracy and stability. Across the studies outlined in this paper that employed a logistic regression method, most models consisted of traditional demographic variables: age, sex, race, education level and employment status. In these studies, variable exclusion was based on a failure of bivariate analyses to demonstrate statistical significance, with the logic that non-statistically significant variables do not enhance the ability to predict. Hosmer and Lemeshow (2010) discussed a growing trend to include all "scientifically relevant variables" into the model regardless of the observed relationship with the outcome variable. The reasoning behind that practice is to capture confounding effects of the variables of interest. The authors reject this practice by arguing that over fitted and numerically unstable models may result.

Caveats about drug court research in general were provided in Cissner and Rempel (2005), Goldkamp et al. (2001), Marlow et al. (2004), and Turner et al. (2002), and are discussed briefly in the literature review. The main concerns center on a lack of proper study design and the insufficient use of statistics. Moreover, concerns about the

reliability of data were raised. Factors such as inconsistent record keeping and changes to information systems contribute to data quality issues. Some drug courts do not maintain or have not maintained computerized information systems, which leads to concerns about the availability of data. All these issues considered, the core issue regarding drug court studies is generalizability.

The concerns with generalizability may be well-founded if the purpose of a study is to infer about drug court or drug court participants as a whole. However, the purpose of many of these studies was not to infer the findings to other drug courts but to analyze a particular phenomenon for a particular drug court. Even if a study design used rigorous statistical methods, findings from one drug court may not be generalizable to another drug court, as drug courts are organized and operated at the local level where operating environments and access to resources differ across drug courts. These differences lead to distinct program requirements for individual drug courts. In as much, this current study seeks to identify factors that are predictive of drug court completion outcomes, specific to the State of Kentucky Drug Court.

Kentucky

According to the U.S. Census Bureau (2010), Kentucky is a southern state, but is bordered by states classified as part of the Midwest (Indiana, Missouri, Illinois) and states considered part of the eastern region (Virginia, West Virginia) with the eastern half of Kentucky situated in the Appalachian Mountain region. Kentucky is known for the blue grass that grows through most of the state, its horse racing, most notably for the Kentucky Derby at Churchill Downs, and for its bourbon distilleries. According to the 2010 U.S. Census (U.S. Census, 2010), Kentucky's total population is 4,339,367 which is

only 7.4% growth from the 2000 census. Kentucky is 87.8% white, shows a high school completion rate (for those 25 and older) of 81%, and 17.7% of the population lives below the poverty line. All these indicators show that Kentucky is less diverse, less educated, and has a higher rate of poverty than the national average. According to the U.S. Department of Agriculture (2012), Kentucky is approximately 42% rural and 58% urban.

Kentucky ranks high on a number of health and social related concerns. This state is ranked 5th in the nation for the percent of adults considered obese and is similarly ranked for levels of physical inactivity (Center for Disease Control, 2012). The data show that 25% of Kentucky residents are smokers. This is more than six and a half percentage points higher than the national current smoker percentage according to the Centers for Disease Control (CDC) (2012). The unemployment rate for Kentucky is 9.1% as of December 2011 (WorkforceKentucky.gov, 2012) which shows that this is higher than the national unemployment rate of 8.5% according to the Bureau of Labor Statistics (2012). All told, these data portray Kentucky as a relatively unhealthy state.

Kentucky has a sizeable drug problem, most acutely in the eastern portion of the state. The eastern section of Kentucky is an area recognized by the National Drug Intelligence Center (NDIC) as a High Intensity Drug Trafficking Area (HIDTA). Specifically, 27 of Kentucky's eastern counties are part of the Appalachia HIDTA. NDIC originally identified this high traffic area in response to the cultivation and distribution of that region's marijuana cash crop, but now includes prescription drugs. According to the NDIC assessment (2007), "the Appalachia region consistently sustains high levels of outdoor cannabis cultivation because of its favorable climate and rich soil" (p. 3). NDIC identified a high poverty rate of the region as a contributing factor to the high intensity

designation. Marijuana production is a means of supplemental income. This report also indicated that in some communities, "cultivation is often a multigenerational trade, since young family members are introduced to the trade by other members who have produced the drug for many years" (p. 3).

Moreover, a report from the Kentucky State Epidemiological Outcomes Workgroup, released December of 2011, stated that the medical and psychosocial burden of illicit use of prescription drugs is "particularly acute in Kentucky" citing increasing rates of illicit use of opiate based drugs and increased prescription rates for hydrocodone, and oxycodone. This report also included staggering statistics that Kentucky experienced a 260% increase in fatal drug overdoses from 1999 to 2008, that Kentucky experienced a 900% increase in treatment admission for opiate based substances, and that fatal drug overdoses surpassed suicide mortality in 2005. All told, Kentucky has a significant drug problem.

Current Study

This current study seeks to identify factors related to successful completion in the Kentucky Drug Court program for cases closed between January 1, 2007, and August 24, 2010, using data available within the management information system. This dissertation used logistic regression to explore and predict completion outcomes. Diagnostic analyses were run prior to the multivariate model to determine which independent variables are meaningfully related to the dependent variable and to identify any independent variables that may be significantly related to each other.

Prior research described in the literature review shows that completion outcomes are affected by individual-level characteristics. These factors include sex (Belenko, 2001;

Hickert et al., 2009; Hiller et al., 1999), age (Cissner & Rempel, 2005; DeMatteo et al., 2009; Hepburn & Harvey, 2007; Hickert et al., 2009; Shaffer et al., 2010; Senjo & Leip, 2001a; Young & Belenko, 2002), race (Belenko, 2001; Dannerbeck et al., 2006; Hepburn & Harvey, 2007; Rempel et al., 2003; Schiff & Terry, 1997; Senjo & Leip, 2001a; Senjo & Liep, 2001b), marital status in terms of treatment retention (Hepburn & Harvey, 2007), employment (Belenko, 2001; Hickert et al., 2009; Shaffer et al., 2010; Mullany & Peat, 2008; Roll et al., 2005), education (DeMatteo et al., 2009; Hepburn & Harvey, 2007; Hickert et al., 2009; Shaffer et al., 2010; Mullany & Peat, 2008; Schiff and Terry, 1997), drug of choice (Belenko, 2001; Hickert et al., 2009; Hiller et al., 1999; Shaffer et al., 2010; Miller &Shutt, 2001), criminal history (Evans et al., 2009; Hickert et al., 2009; Mullany & Peat, 2008), mental illness (Hickert et al., 2009; Hiller et al., 1999), familial status and social supports (Hickert et al., 2009; Hiller et al., 1999; Rempel & DeStefano, 2001). Research also shows that drug court program delivery elements such as quantity of status hearings (Goldkamp et al., 2001; Marlowe et al., 2006) quality of status hearings (Cissner & Rempel, 2005), sanctions (Belenko, 2001), treatment participation (Cissner & Rempel, 2005; Marlow et al., 2004), and how long a drug court has been in operation (Belenko, 2001) can influence completion outcomes. The extent to which these factors individually contribute to program completion is difficult to ascertain because of the interaction between all elements (Belenko, 2001; Cosden et al., 2006; Hickert et al., 2009). The inconsistencies among findings within the literature may be driven by the fact that each drug court operates in a different environment, offers and/or requires different services which are provided by different providers and such services are managed and deliver services differently. As a result, most drug courts are not directly

comparable to each other. One drug court's set of best predictors may not be the same as another's.

Hypotheses

The current research seeks to identify factors that influence program completion outcomes for the State of Kentucky's drug court program. Three hypotheses are tested in this study.

Hypothesis one. Characteristics about a participant predict completion outcomes. Specifically, sex, age, race, marital status and education level can be used to predict program completion outcomes.

Consistent with prior studies and theory as described in the literature review, participants who possess certain characteristics indicative of distractions from or barriers to drug court compliance are expected to show a decreased likelihood of graduating. Females, older participants, non-whites, participants who are married, and those without a high school diploma are expected to show less favorable outcomes. The assumption of drug court leadership (Neal, 2010) is of interest in this study. Neal speculated that females are more likely to be primary caregivers of minor children (not tested in this study) and that primary care giving for minor children adds to the difficulty of completing drug court programming; therefore females are expected to show less favorable outcomes than males. The logic used for this increased-responsibilities argument can be applied to married participants; that these characteristics indicate increased responsibilities that lie outside the drug court influence and therefore increase the level of difficulty in meeting program requirements. For example, being married may carry the responsibility to care for children and a spouse in addition to the work needed to

meet drug court requirements. Participants without a high school diploma are expected to show less favorable outcomes, as the less educated are likely to experience difficulty obtaining and then maintaining quality employment; thereby also experiencing challenges with access to resources to support program requirements or comply with money-based program requirements (e.g., vehicle or other transportation, money for fees, fine, or other payment court obligations, or money to maintain stable housing).

Hypothesis two. Problem behaviors leading into program participation and punishments while in drug court (sanctions) predict program outcomes. Specifically, drugs of choice, crime types, and in-program punishments predict program completion outcomes.

Drugs of choice are not well researched in the literature, although harder drugs have been found to result in less favorable outcomes. As such, participants indicating drugs of choice including cocaine and crack, as well as opiates such as heroin, are expected to show decreased odds of graduation. The number and type of crimes a participant holds is also of interest for this study. A greater number of charges and certain charge types may indicate a deeper level of criminal lifestyle and therefore a riskier participant. Participants carrying multiple charges and charge types that suggest a deeper level of criminal lifestyle, such as drug manufacturing and crimes against a person, are expected to show a decreased likelihood of graduation.

Sanctions are also of interest. The type of sanctions one receives while in drug court is not well documented in the literature, but some research suggests that not receiving jail sanctions may be related to an increased likelihood of graduation (see Belenko, 2001). However, receiving a sanction indicates some sort of issue with program

compliance. The noncompliance itself, rather than type of sanction, may drive program termination leaving any influence sanction has on completion outcomes driven by the non-compliance rather than sanction type. In this scenario, no difference in completion outcomes is expected for any of the sanction types. However, given that severe sanctions may be documented more reliably than other sanction types, participants who received a sanction involving incarceration are expected to show decreased odds of graduating. Moreover, the number of sanctions a participant receives may be indicative of a level of program compliance or may represent a measure of willingness of drug court staff to issue punishments for non-compliance. In either case, a greater number of sanctions is expected to result in a lower likelihood of successfully completing the drug court program.

Hypothesis three. Characteristics about the drug court program predict completion outcomes. Neglected in the literature is how the drug court itself may influence completion outcomes. In this study, only two elements of the drug court programming were available for study: the track through which a participant entered drug court and how long the drug court was in operation at the time of entry. Participants entering drug court through the diversion track are expected to show a greater likelihood of graduating than those on the probation track. This is expected as those on the diversion track have more to lose from failing to complete drug court. Those on diversion track risk imposition of both the conviction and the jail or prison sentence while those on the probation track are already convicted and risk only the imposition of the sentence. The relationship between the length of time a drug court is in operation and completion outcomes is not well documented in the literature. Belenko (2001) only briefly discusses

it by providing anecdotal evidence that time in operation may influence outcomes in either direction. The findings here will be a unique and important addition to the literature.

CHAPTER III
METHODS

The purpose of this study is to identify factors related to drug court program completion outcomes using data obtained from Kentucky Drug Court. The analytic strategy uses a cross-sectional study design with logistic regression for the statistical method. The variables of study are limited to those collected by drug court staff and contained within the computerized case file and information management system. SPSS (v.19) was used as the statistical tool for this research.

Data Collection

The data collection for this study occurred as part of routine program management for the Commonwealth of Kentucky's Drug Court. Drug court staff enters participant data into a custom-developed Management Information System (MIS) as part of case management practices. Participant records are updated on a regular basis by drug court staff with information relating to progress in the program. The data used for this study were pulled from MIS upon the researcher's request. After discussion with drug court staff regarding reliability of the data, drug court staff suggested that data from 2007 and later be used. Staff agreed to pull from January 1, 2007, to the date of the request (August 24, 2010), which resulted in access to records that were closed during a three year and nine month time frame. Drug court staff suggested the 2007 time frame as that is the year when most drug court staff was trained on using the MIS. Data prior to 2007 are considered more likely to be incomplete and unreliable for research purposes. This data

pull resulted in a total of 3,621 unique participant records from 83 drug courts within the Commonwealth of Kentucky.

Records were included in the study if the record showed:

- the participant was 18 years of age or older (excludes juveniles),
- the participant participated in the felony, adult drug court (excludes juvenile, family and misdemeanor drug court participants),
- the participant successfully passed through the assessment and screening process (excludes records of those not eligible or those that did not begin the program),
- the record has a date of entry documented (excludes cases where date of entry could not be determined), and
- the record resulted in a date closed between January 1, 2007, and August 24, 2010.

The data were provided to this researcher in multiple Excel workbooks. Kentucky Drug Court staff provided a spreadsheet for participant level information and one spreadsheet for each of the major variables types where a one-to-many relationship exists. A one-to-many relationship occurs when one participant record contains multiple entries. In this study, a participant may have more than one drug of choice, charge, and sanction records in the database; therefore, Kentucky Drug Court staff pulled these variables separately. The data were imported into SPSS (v.19) files, restructured on participant ID, and then merged on participant ID to form a flat file. Variables for completion status, race, sex, marital status, education, track, drug of choice, charge, and sanctions were collapsed to accommodate the logistic regression analysis. The variables of interest were explored for model selection, and those variables that demonstrated a meaningful relationship to the dependent variable were included in the logistic regression.

Discussed in the literature review were other individual level characteristics, specifically employment, presence of mental illness and presence of family and social supports. Although this data may be collected by drug court staff during the eligibility

review, this data is not recorded in a manner that allows for inclusion in this study. Employment information is collected at the time of entry, however, data is not complete enough to determine if the participant was employed at the time of entry or if the employment is gained while in the program. The presence of mental illness and presence of family and social supports is captured during the assessment process; however this information is not entered into the MIS.

Dependent Variable

Graduation status is the primary focus of the study; therefore this variable was recoded into a binary variable containing the values of not graduated and graduated (0,1). This coding scheme showed that 29.8% of the total population of study graduated. Completion status originally contained three values: terminated, administrative discharge, and successful completion. Administrative discharge accounted for only 5.5% percent of the records and was included in the "did not graduate" category. Administrative discharge may occur when a participant is dismissed from the program, but not through a non-compliance issue. This program completion status can be used when a participant becomes injured or ill and unable to meet requirements. Participants discharged through this outlet are eligible for drug court in the future whereas participants who are terminated are ineligible for future participation.

Independent Variables

Variables included in this dataset fall into one of three domains and follow the organization of the hypotheses. First are the data that inform upon the individual. Demographic variables including sex, age, race, marital status, and education level are used to explore participant characteristics. Second are the variables that demonstrate the

problem behaviors leading into drug court participation. Variables for problem behaviors include drugs of choice, the charges an individual carries, and sanctions. Thirdly, program variables, meaning those variables that reflect characteristics about the drug court program and do not change given an individual's choices or performance while in the program include the track through which a participant entered the program, and how long the drug court was in operation at the time the individual entered drug court.

Since the data for this study originated from the Kentucky Drug Court's MIS, some data required recoding for research purposes. In most cases, the data provide showed far more categorical "types" of phenomenon than usable for study. See Appendix B for recoding and classification schema. In the sections that follow are descriptions and discussions of each of the variables included in the study.

Participant characteristics. Table 3, included below, shows the details of each participant characteristic studied. Participant characteristics in this study are limited to those contained within Kentucky Drug Courts' MIS. Sex, age, race, marital status and education are included.

Sex. The sex variable is limited to the categories of male and female. The original sex variable allowed for unknown (n= 2) and other (n=28) categories. Kentucky Drug Court staff indicated that unknown or other can be and are used in cases where a participant verbally indicates transgender/transsexual for their sex. Kentucky Drug Court staff confirmed they have had transgender/transsexual participants. Given the infrequent occurrence of "other" and only two observations of "unknown," these cases were deleted to protect from unintentional identification of an individual participant. In the study population, 62.1% of the population is male and 37.9% female.

Age. The age variable is continuous and represents the age of the participant on the day they entered drug court. This variable was computed by subtracting date of birth from the date of entrance and is documented in years. The median age for this drug court population is 29 with the youngest at 18 years of age and the oldest at 69 years of age. More than half of the population is less than 30 years of age. Logistic regression makes no assumption about distribution of the variable (Mertler & Vanatta, 2005; Pampel, 2000); therefore no recoding or transformations of the age variable was necessary.

Race. Kentucky Drug court allows for 10 distinct racial classes. Nearly 97% of the Kentucky Drug Court population under study indicated a race of either white or black/African American, leaving approximately three percent spread across the remaining eight classes. Leaving race in the original categories will result in violations of the cell count rules for bivariate and multivariate analyses such as chi-square and logistic regression, which require no fewer than five counts per cell (Mertler & Vanatta, 2005). Appropriate binning to best capture the effect of race on program completion becomes complicated in this situation. To use only white and non-white may miss differences experienced by races included in the non-white category. However, given so few observations in the data, a dichotomous (white, non-white) variable was the solution selected. Schiff and Terry (1997) also collapsed race in this manner with similar justification; "because of the lack of sufficient numbers in each category" (footnote, p. 303). A white/non-white classification method was also used in other drug court outcomes studies, namely Butzin et al. (2002), Goldkamp et al., (2001), Hepburn and Harvey (2007), Hickert et al. (2009), Peters et al. (1999), Schiff and Terry (1997), and Senjo and Leip (2001b). Refer to Table B1 for details on the coding of race.

Marital status. Kentucky Drug Court documents marital status as divorced, married, never married, other, separated, single, or widowed. To ensure cell frequencies were sufficient for statistical analyses, the categories for marital status were collapsed into married or not married.

Marital status was changed to system missing in situations where marital status was listed as "other." This was done as no operational definition of "other" could be identified by Kentucky Drug Court staff. However, one staff member (Hardin County Drug Court, 2010) suggested that this other category may include participants who were engaged, homosexual couples in significant relationships but unable to legally marry, or those who were still legally married but living apart. This affected less than one percent of the population of study. This classification method showed that more than 75.9% of the study population showed not married and 19.2% indicated they were married. Data on marital status were missing for 4.9% of the records. Refer to Table B2 for details on the coding of marital status for this study.

Education. The education variable represents the highest level of education achieved on the day of intake. According to the 2010 U.S. Census, Kentucky showed a high school graduation rate of slightly more than 74% for those aged 25 and older. This is more than six percentage points lower than the national rate of 80%. Kentucky Drug Court documents 20 distinct educational values and places emphasis on documenting the level of high school last completed if a participant has not graduated high school. Kentucky Drug Court also documents high school equivalencies such as a GED or alternative school completion. This level of detail is remarkable and is worth exploring; however, a broad range of groups such as this causes cell values to drop below the five

observation threshold. Education is grouped into two categories of less than high school and at least high school. This method is consistent with the majority of drug court studies reviewed here that included an education variable. In the current data, 29.6% indicate less than high school while 62.5% show at least a high school diploma or equivalent. Data on education level was missing for 7.9% of the records. Refer to Table B3 for details on the coding of education for this study.

Table 3
Participant Characteristics

		Percent Participants
Sex		
Male		62.1
Female		37.9
Age		
Mean	30.66	
Median	29	
Mode	22	
Min/Max	18/69	
Race		
White		85.0
Not White		15.0
Marital Status		
Married		19.2
Not married		75.9
Missing		4.9
Education Level		
Less than high school		29.6
High School		62.5
Missing		7.9

Problem behaviors. The problem behaviors leading into drug court participation include involvement with drugs and crime. This study also examines the number and types of sanctions one receives while in drug court. A participant must have committed some type of crime and indicate a problem with some type of drug. The number and

types of sanctions are indicative of some problem behavior while in the drug court program.

Drugs. The MIS for Kentucky Drug Court allows for more than one drug of choice to be entered. Knowing the number of drugs an individual finds problematic allows us to determine if trouble with more than one drug, also termed polysubstance abuse, results in worse program outcomes. For this study, the number of drugs of choice was counted.

Discussion surrounding the number of drugs of choice is sparse within drug court literature, perhaps because a drug of choice is operationalized in most studies as the "one" drug most problematic. Of the key studies on drug court completion outcomes, none included a count of multiple drugs of abuse. However, Brown and colleagues (2010) in their study on the impact of jail sanctions on treatment outcomes studied polysubstance abuse (abusing more than one drug). Using the Cox proportional hazards model to determine factors that predict time to treatment failure, they found that polysubstance abuse was a statistically significant predictor. This finding suggested that abuse of more than one drug is a treatment hazard, meaning it increases the risk of treatment failure. Since prior research suggests that treatment can influence drug court completion outcomes, the number of drugs listed as a drug of choice is included for study.

Kentucky Drug Court allows the specific drug of choice to be selected from a drop down list and manually entered into the MIS. The original data file contained 47 unique entries for drug of choice. Several of these were misspellings while others were the same drug but called something slightly different. All drugs of choice were collapsed

to seven categories to ensure the case to variable ratio remains appropriate for a logistic regression. Categories were selected by this researcher and drug court staff after reviewing the drugs appearing in the data file, their frequencies, and drug court information needs. For example, although both cocaine/crack and methamphetamine could fit into a category for "stimulants," Kentucky Drug Court staff suggested that cocaine/crack and methamphetamine should be in distinct categories.

The final drug of choice variable consists of seven dummy coded variables (0,1) with zero indicating the absence of and one indicating the presence of the particular drug type. The final groupings of drug types are methamphetamine and other stimulants, cocaine and crack, marijuana, opiates, alcohol, sedatives/downers and "other" drugs. "Other" drugs included inhalants, PCP, and LSD. Refer to Table 4 for percent of participants indicating each drug of choice and Appendix B, Table B4 for detailed coding information.

A conceptual issue with drug of choice as a variable in this study is that an actual measure of a participant's "drug of choice" is not available. Drug of choice, as a concept, suggests a single drug that is most problematic or most preferred. However, in Kentucky Drug Court, a participant may have more than one drug of choice documented. Moreover, the MIS places the drugs of choice in alphabetical order rather than in order of relative importance. There is no way to determine which drug was most problematic or preferred. Therefore, all drugs of choice listed for a participant are assumed to be equally problematic. The most common drug of choice listed is opiates, with 43.4% of all participants indicating some type of an opiate. This was followed closely by marijuana with 42.8% of participants.

Table 4
Drugs of Choice

	Percent Participants
Opiate	43.4
Marijuana	42.8
Alcohol	32.0
Cocaine/Crack	27.8
Sedative/Downer	24.2
Meth or other stimulant	18.3
Other	3.0

Note: Values total more than 100%; a participant may indicate more than one drug of choice.

Crime. The type of crime a participant was convicted/stands accused of at the time of entry into drug court is included as a variable in this study. The charge a participant carries may be important to understand as some research shows that charge has a relationship to program completion outcomes (Evans et al., 2009; Mullany & Peat, 2008; Peters et al., 1999; Senjo & Leip, 2001a). However, operational definitions of charge or charge type differs between studies. For example, Senjo and Leip (2001a) found that participants charged with a cocaine related crime show poorer outcomes than those not charged with a cocaine related charge. In this case, the only charge examined was any cocaine related charges, leaving all other non-cocaine charges and all other non-drug charges unexamined. Sechrest and Shicor (2008) and Shaffer et al. (2010) find no differences with regard to charge type at time of admission when charge was defined in terms of any drug sale or drug possession. Only one study reviewed here provided an examination of charge types beyond drug or drug related crimes. Anspach (2004), in an evaluation of Maine's adult drug treatment court, reviewed charge type by crimes against a person, property related, drug related, motor vehicle related, and probation violation related. However, these analyses provided only percent discharged from drug court, did not include tests of statistical significance, and did not include classification information on exactly what charges were included in the categories.

Kentucky Drug Court provided the data on participant charges, which resulted in 480 unique offenses. Given the narrow range of charge types reviewed in prior research and the lack of analysis when a broader range of charges was included, using the prior research to frame charge classification in this study is problematic. The classification method used in this study centers on the grouping of similar offenses with regard to qualities of the harm caused. For example, drug possession differs from the sale, manufacturing, or trafficking of a drug in that the quantity of drug on the person is minimal (i.e., for personal consumption). Selling, manufacturing, or trafficking a drug implies either a quantity beyond sufficient for individual use with some evidence that the use is intended for others. Additionally, selling, manufacturing, or trafficking of drugs suggests an increased level of criminal involvement. Increased level of criminal involvement is a key factor in assessing level of risk, which is also shown to impact drug court outcomes (Marlowe et al., 2003; Marlowe et al., 2006; Spohn et al., 2001).

The final classification method resulted in eight dummy coded variables (0,1) with zero indicating the absence of and one indicating the presence of the particular charge type. The final categories are drug sale/trafficking/manufacturing, drug or drug paraphernalia possession, vehicle or traffic related (excludes driving under the influence), charges relating to the administration of justice, charges relating to public order, crimes against a person, property crimes, and any charge of driving under the influence (DUI). Possession charges were the most common, indicated by slightly more than 37.4% of participants. This was closely followed by property crimes indicated by 27.5% of participants. Table 5 shows a breakout of charge type by percent participants. See Appendix B, Tables B5-B12 for details on the coding of criminal charges.

Table 5
Criminal Charges

	Percent Participants
Drug Possession	37.4
Property	27.5
Administration of Justice	15.4
Drug Sale/Traffic/Manufacturing	14.4
Person	6.8
DUI	5.9
Public Order	5.7
Vehicle/Traffic	4.7

Note: Values total more than 100%; a participant may indicate more than one drug of choice.

Sanctions. Table 6 shows the types of sanctions received and the percent of participants who received the sanction. Sanctions in drug court refer to the official responses to infractions of program rules. In other words, sanctions represent punishments for non-compliance. Sanctions are issued by the drug court judge, most often during drug court proceedings in the courtroom. Sanctions can also originate by suggestion from drug court staff. In Kentucky Drug Court, there is no standard guideline for issuing sanctions, leaving the potential for each drug court and each case specialist to hold different sanctioning practices. This may affect both the frequency of sanctioning and the type of sanctioning.

In addition to different sanction practices between and within drug courts, drug court staff indicated that this data point may not be reliable because of differing data entry practices. Informal discussions with multiple drug court staff members in different drug courts revealed that some staff do not enter sanctions into the database, while others selectively enter sanctions. When discussing the reliability of the data, several drug court staff indicated that data entry of sanctions and rewards, although important to drug court progress, are not a priority. For example, one drug court staff indicated that they only enter major sanctions or sanctions when another agency, such as a treatment agency, a

jail, or some other organization supporting community service sanction, is involved. If this is a common practice among drug courts, minor sanctions or those under the complete control of drug court, such as increased homework, changes in curfew, increased drug testing, or phase demotions are underrepresented in the data. Further study on program non-compliance, formal and informal responses to non-compliance, and documentation of these responses is warranted, although outside the scope of this research.

Even though unreliable as a measure of all sanctions, the variables collected for this study may be good indicators of the more intensive sanctions such as jail and additional treatment. Since sanctions are found to influence drug court completion outcomes (Anspach, 2004; Marlowe et al., 2006) and associated treatment completion outcomes (Brown et al., 2010), the number of sanctions will be examined to determine if they impact completion outcomes. For the current study, this variable is continuous and represents the total count of sanctions received while in the drug court program. The mean number of sanctions for the population of study is 3.7, the median is three, and the most frequently observed count is zero.

Kentucky Drug Court documents 16 unique sanction types. To keep the case to variable ratio within acceptable limits for bivariate and logistic regression analyses, this variable was collapsed into six dummy coded variables (0,1) with zero indicating the absence of and one indicating the presence of the particular sanction type. The final categories are incarceration/detention, treatment or treatment related, community service, phase demotion or suspension, increase in program elements, and other. See Table B13 for details on coding of sanctions for this study.

Incarceration or detention includes any type of sanction that involves confinement to a correctional facility or house. The incarceration or detention sanction type does not include mandated in-patient or residential treatment, as those were placed in the treatment or treatment related category. A community service sanction is any type of sanction where the participant was required to perform some type of work within the community, which may include activities such as cleaning the drug court office, working at the local animal shelter, or road cleanup crew. Phase demotion or suspension includes anytime a participant is either demoted in their program phase status, for example, from phase II down to phase I, or when a participant is suspended from program participation. Suspension can include situations where an individual is suspended in his or her current phase status rather than advanced to the next phase. An increase in program elements can include actions such as additional assignments, earlier curfew, or an increase in the frequency of drug tests. According to drug court staff, sanctions included in the "other" category may include sanctions such as increased number of drug court groups, an essay for the judge, or cleaning of the drug court office area. However, these kinds of sanctions may also be included in the increase in program elements or community service categories. This issue suggests that the sanction categories may not be mutually exclusive. Moreover, usage of the "other" category may vary widely across drug courts and deserves further attention.

The most frequently recorded sanction listed is for incarceration or detention, with 70.4% of participants having at least one such sanction documented. The second most commonly recorded sanction is for community service with 27.3% of participants. The large gap from the most prevalent and the second most prevalent sanction could suggest

that incarceration/detention sanctions are better documented than the other sanctions types.

Table 6
Sanction Types

	Percent Participants
Incarceration/Detention	70.4
Community Service	27.3
Other Sanction	19.7
Treatment/Treatment related	18.4
Increase Program Elements	13.9
Suspension/Demotion	10.9

Note: Values total more than 100%; a participant may indicate more than one drug of choice.

Drug court variables. Drug court variables used in this study include the track through which the participant entered drug court, how long a program was in operation when the participant entered, and the number of months the participant spent in the program.

Track. "Track" refers to the route through which an individual enters drug court. Kentucky Drug Court documents track in one of four categories: probation, diversion, contempt, or family. A participant enters through the probation track generally when other probation efforts have failed or when the judge sends an individual directly to drug court rather than traditional probation. Non-compliance while on traditional probation, frequently caused by multiple positive drug screens, may result in a referral to drug court as a last chance effort to remain out of prison. In this case, the judge, in consultation with defense and prosecuting attorney, may offer drug court as a one-time alternative to prison. In both of these scenarios, participants enter drug court as a form of supervision more intense than traditional probation.

In contrast to the probation track, participants may also enter drug court through the diversion track, meaning the charge(s) they stand accused of will be dropped upon

successful completion of the program. If a participant successfully completes drug court programming through the diversion track, then a conviction is avoided.

Two other tracks are possible for Kentucky Drug Court: contempt and family. Entry into drug court through the contempt track may occur when offered by a judge in relation to a charge for contempt of court. The family track, as a route of entry into drug court, may occur when a participant in a family court action experiences issues with drug or drug related charges and the family court and criminal court judge agrees that drug court is an appropriate option. Both of these alternative tracks are infrequently used for felony adult drug court, and comprise less than one percent of the total population under study. Since these routes of entry are infrequent and to ensure that cell values are appropriate for analysis, these values were coded as system missing.

Track type will be used in this analysis to determine if the route through which one enters drug court bears any influence on completion outcomes. As described in the literature review, the original drug court model was designed as a diversionary program, but now often includes those on probation. Some authors have suggested that drug court's scope has expanded to included offenders with higher risk levels and those already in the system (for discussion see Leukfeld, 2004; Marlow et al., 2006; Miethe et. al, 2009; Petyton & Grosswieler, 2001) leaving the current population served very different than the model originally intended. Initial descriptive statistics for Kentucky Drug Court shows that only 27% of the population under study came into drug court on the diversion track. Slightly more than 72% enter through the probation track and less than one percent through the contempt and family drug court track. This may suggest that Kentucky Drug Court services a population of higher risk than the original model intended. Also, given

that higher risk individuals often show poorer completion outcomes, the track an individual come through while a participant in drug court may prove useful to understanding the completion outcomes.

Time program operational. This variable represents the number of months the specific drug court program was in operation when the participant entered the program. This variable was calculated by subtracting the date the program was implemented from the date the participant began the drug court program. As discussed in the literature review, Belenko (2001) observed that the time a program is in operation is important in understanding outcomes. Program success may be dependent on allowing time for a program and staff to work through implementation issues and develop the necessary community relationships.

Months in program. The number of months an individual participated in the drug court program was calculated using the date of entry and the date of last status change. This variable showed a median of nine months in program for those who did not graduate from drug court and a median of 21 months in program for those who graduated. This finding should be self-explanatory as those who do not graduate the drug court program will have less time in program. Since graduation is a function of time in the program this variable is not included in the logistic regression analysis. However, this variable may be important when examining differences within the outcome groups.

Data Summary

The original dataset contained 3,621 records. After data cleaning, the final dataset contains 3,497 unique records. Several records were deleted because the information showed that they were outside the requirement of the data pull. For example, 41 records

were deleted as they showed dates and/or descriptions of codes of ineligibility or non-acceptance, or no time in the program was indicated. The focus of the research is to examine drug court participants, not those that were not eligible for participation. Ten cases were deleted because of errors in the dates of entry. Forty-three records that showed an age less than 18 upon entry into drug court were deleted, as this research was limited to adult drug court. In isolated instances, individuals younger than 18 may be allowed to begin adult drug court; however, those cases represent unique case scenarios and are therefore excluded from the dataset. Thirty records where an individual participant's identity could potentially be identified through bivariate analyses were deleted. This was limited to the "unknown" and "other" responses for the sex variable. A total of 124 records, or slightly less than 3.5% of the total dataset, were deleted.

Descriptors of the population under study shows roughly 62% are male and 38% female. The drug court population in this study is listed as 85% white and 15% non-white. The median age of the population is 29 years old and more than half of the population of study was less than 30 years of age at the time of intake. Roughly a third of the population under study showed an education level of less than high school. Seventy-two percent of the population under study entered drug court through the probation track. The outcome variable, which represents the completion outcome, shows graduation rate of slightly less than 30%.

In contrast to the drug court population, the Commonwealth of Kentucky population statistics show roughly 51% male, 89% white, a median age of 36.5 and a 80.3% completion rate for high school (U.S. Census Bureau, 2010). This general

comparison suggests that the drug court population under study is younger, slightly more racially diverse, and less educated than the general Kentucky population.

Logistic Regression

Logistic regression is selected as the analytic strategy for this research. The dependent variable for this study, program completion outcome, is categorical with values of graduated and did not graduate. Logistic regression is similar to both the multiple regression and the discriminate analysis techniques in many ways, but best fit the data at hand and research goals. Multiple regression uses two or more continuous independent variables to predict the value of a continuous dependent variable (Pampel, 2000). Discriminate analysis, on the other hand, seeks to predict group membership within a categorical dependent variable from multiple independent variables. Logistic regression is often used as an alternative to both multiple regression and discriminate analysis as it carries properties of each of the techniques. Logistic regression regresses independent variables on a categorical dependent variable to predict group membership (Mertler & Vanatta, 2005). The current study seeks to predict program completion outcomes, either a participant graduated or did not graduate from the program, by using a combination of continuous, ordinal, and categorical variables, leaving logistic regression as the most appropriate statistic for this research.

Methods of logistic regression. There are three main types of logistic regression: enter, forward, and backward. An "enter" logistic regression enters all variables into model simultaneously (Field, 2005). Using the enter method for logistic regression, a researcher can examine the individual contribution of each variable while holding all other variables constant (Hickert et al., 2009). The enter method for logistic regression is

limited, however, in that it does not allow for the examination of relationships between predictors. A variation of the enter method that allows for a limited examination of how the predictors may be related to each other is a blockwise enter method. With a blockwise enter method the researcher forces entry of the variables in specified groups and in a specified order based on a priori decision criteria (Field, 2005; e.g., theory, past research, time causal ordering). Entering variables in blocks allows researchers to assess the contribution of each group (block) of variables and also assess changes in contributions of individual variables when other variables are introduced into the model.

A brief discussion about stepwise methods is warranted before a description of forward stepwise logistic regression is offered. The term *stepwise*, in relation to statistics, refers to entering of variables in "steps," and generally refers to a variation in statistical analysis methods where a computer algorithm selects the order of variable entry into the model (Menard, 2010). Stepwise is contrasted with the more traditional approach of using some a priori decision criteria selected by the researcher. The use of stepwise methods is contentious (see Hosmer & Lemeshow, 1989; Mundry & Nunn, 2009), but considered permissible in the absence of prior precedence or theory, or when the purpose of the research is the identification of predictors (Hosmer & Lemeshow, 1989; Menard, 2010; Tabachick & Fidell, 2007). Some authors argue that stepwise methods result in over fitted models that cannot be generalized beyond the dataset used to generate the model (Hosmer & Lemeshow, 1989; Mundry & Nunn, 2009); however, this criticism is not applicable when the research effort is not attempting to draw inferences beyond the dataset at hand, such as the case with the current study. Additionally, Mundry and Nunn (2009) suggest that stepwise methods should never be used for null hypothesis

significance testing as it greatly increases the probability of a type I error. In the following description of forward logistic regression, the term *stepwise* refers to the computer algorithm selected entrance criteria.

A forward stepwise method enters predictors into the model one at a time, in the order of importance. The algorithm selects the order of entry based upon the variable's contribution to "how well the model fits the observed data" and excludes unproductive variables (Field, 2005, p. 226). The most important predictor is entered at step one, the second most important at step two along with the variables from the previous step, and so on until all productive variables are entered into the model. A forward entry allows a researcher to examine relationships among the predictor variables by examining individual contributions to model fit as each variable is entered into the model.

In this study, the logistic regression analyses were run in two major ways, first, through the variable selection method recommended by Hosmer and Lemeshow (1989), Menard (2010) and Tabachick & Fidell (2007) and second, without using variable selection. Using variable selection methods, an enter method logistic regression, Model I, was conducted to test the hypotheses. A second model, a forward entry stepwise logistic method, was used to identify the order of importance and potential relationships among predictor variables. A third model excluded unproductive or problematic variables to assess model performance in the absence of these variables. The second major way the multivariate analyses were run was with all variables under study, with one variable identified as having problems with multicollinearity excluded. This fourth model was run with all variables under study to assess the variable selection process and to explore any potential interactions between predictors.

Assessing assumptions. Logistic regression is considered more flexible than either the multiple regression or the discriminate analysis methods as it does not make assumptions about distribution, random sampling, a linear relationship between variables, and homogeneity of the variance (Hosmer & Lemeshow, 2000; Mertler & Vanatta, 2005; Tabachnick & Fidell, 2007). Although assumptions are few, concerns with logistic regression models include the case to variable ratio, multicollinearity, and outliers. These areas of concern were assessed and identified through a series of diagnostic tests and are discussed below.

Case to variable ratio. To ensure sufficient number of cases relative to the number of independent variables, unproductive variables were removed for the multiple logistic regression. With a large enough sample size, such as observed in the data for this research, a statistically significant finding could mean relatively little for identifying relationships between variables (Tabachnick & Fidell, 2007). In instances such as this, the relationship may be significant, but not meaningful or productive. In this case, measures of effect should be used in combination with tests of statistical significance (Tabachnick & Fidell, 2007).

In this study, productivity of the variable means that the independent variable is not only related to the dependent variable in a statistically significant way ($\alpha = .10$), but demonstrates at least a small strength of relationship (Pearson's *r* greater than or equal to .1 or -.1) as defined by Cohen (1988). Menard (2010) and Cox (1970) suggest that linear methods can be applied directly to binary variables when coded in a 0,1 format. Cox (1970) argues that the binary variable can be treated "just as if they were quantitative observations" (p. 16), but further explains that this type of method is limited for binary

data analysis. In this manner, this linear method was used as a diagnostic tool only, and was followed by the more appropriate method for assessing the predictive relationships of binary variables, which is the logistic regression method. The use of bivariate correlations as an initial diagnostic tool for subsequent logistic regression models was used in other drug court studies, namely Cosden et. al (2006) and also Hiller et. al (1999). Herein the combination of statistical significance and sufficient strength of relationship is termed meaningfully related. See Appendix C, Table C1 for the correlation matrix details on all variables, Table 8 for correlation results between the predictors and the outcome variable, and Table 9 for a listing of meaningfully related variables.

As logistic regression relies on a goodness-of-fit test to provide a measure of how well the model fits the data, expected cell frequency counts should not drop below a count of five (Mertler & Vanatta, 2010; Tabachnick & Fidell, 2007). Therefore, the variables race, marital status, education, drugs of choice, charge type, and sanction type were collapsed into fewer categories. Category selection was guided by theory, reviews of methods used in prior research, and frequencies observed within the data. The unknown and other categories in the sex variable were deleted, in part because of the potential to violate the cell count criteria, but also to protect against the identification of an individual participant. These methods for ensuring sufficient case to variable ratio and expected cell frequency counts are suggested by Tabachnick and Fidell (2007), Mertler and Vanatta (2005), and also discussed by Menard (2010) in terms of model specification, variable selection, and model building. Appendix B shows the details of all variable recoding.

Multicollinearity. Correlations (Pearson's *r*), tolerance and variance inflation factor (VIF) scores were calculated to assess issues of collinearity among the independent variables using a multiple regression method. Variables with a VIF score greater than ten and tolerance scores less than .10 indicate a potential problem with multicollinearity (Pallant, 2007). Although multiple regression is an inappropriate statistic for a binary dependent variable, this method is suggested by Menard (2010) who stated that tests for collinearity are

> typically not available in logistic regression software, but can easily be obtained by calculating a linear regression model using the same dependent and independent variables as you are using in the logistic model. Since the concern is with the relationship among the independent variables, the functional form of the model for the dependent variable is irrelevant to the estimation of collinearity. (p. 127)

Pearson's *r* was used to assess any multicollinearity indicated by the tolerance and VIF scores. A Pearson's *r* of +/- .5 or greater was used to identify other highly related variables. Only one variable, the number of drugs of choice, exceeded these thresholds and was therefore removed from variable selection. See Appendix C, Table C2 for VIF and tolerance scores, and Table C1 for the correlation matrix for predictor variables.

Outliers. Outliers for each logistic regression model were identified with parameters set to list cases where residuals exceeded three standard deviations and for which the model did not predict well. After deleting unproductive variables and the variable showing multicollinearity, no outliers were found in any of the logistic regression models.

Exclusion of irrelevant variables. Correlation coefficients were used to assess the relatedness of the independent variables to the dependent variables (discussed previously under case-to-variable ratio). Only variables that were meaningfully related to the dependent variable were included. Excluding unproductive variables increases the efficiency and overall fit of the model (Menard, 2010). As discussed earlier, productivity or the meaningfulness of the relationship between variables was assessed with a relaxed significance level ($\alpha = .10$) as suggested by Menard (2010) and a strength of relationship where *r* was at least .1 or -.1 or considered at least small using Cohen's (1988) effect size criteria.

Methods Summary

Bivariate analyses are used to describe the population under study, select variables for multivariate analyses and test for relationships between predictor variables. Multivariate analyses run for this study include enter and forward logistic regression methods. This study uses the logistic regression methods to determine which factors are related to drug court completion outcomes. Given that prior research finds relationships among predictor variables and some authors argue that variable selection process may exclude relevant variables, this study also uses bivariate and multivariate methods to assess problematic variables and also assess the variable selection process.

CHAPTER IV
FINDINGS AND ANALYSIS

Bivariate Analyses

The variables included in this study were limited to those previously identified as related to program outcomes and those with a theoretical relationship to program completion. Table 7 shows each variable under study and the number and percent of participants for both graduates and non-graduates of the drug court program.

Table 7
Independent Variables by Graduation Status

Variable	Graduates		Non-graduates	
	N	%	N	%
Sex				
Male	610	58.5	1560	63.5
Female	432	41.5	895	36.5
Race				
White	927	89.0	2046	83.3
Non-white	115	11.0	409	16.7
Marital Status				
Not Married	742	71.2	1911	77.8
Married	266	25.5	407	16.6
Missing	34	3.3	137	5.6
Education				
Less than high school	215	20.6	819	33.4
At least high school	779	74.8	1408	48.6
Missing	34	4.6	228	9.3
Drugs of Choice (% yes)				
Meth or other stimulant	263	25.2	376	15.3
Cocaine/Crack	251	24.1	720	29.3
Marijuana	408	39.2	1087	44.3
Opiates	402	38.6	1117	45.5
Alcohol	308	29.6	810	33.0
Sedatives	221	21.2	627	25.5

Table 7 *(continued)*

Variable	Graduates		Non-graduates	
	N	%	N	%
Drugs of Choice(% yes)				
Other	24	2.3	84	3.4
Charges (% yes)				
Sale/Trafficking/ Manufacturing	217	20.8	287	11.7
Vehicle/Traffic	46	4.4	120	4.9
Drug Possession	469	45.0	840	34.2
Administration of Justice	83	8.0	457	18.6
Public Order	46	4.4	152	6.2
Person	49	4.7	190	7.7
Property	192	18.4	769	31.3
DUI	79	7.6	126	5.1
Drug Court Track				
Diversion	354	34.0	593	24.2
Probation	685	65.7	1852	75.4
Missing	3	0.3	10	0.4
Sanctions				
Incarceration / Detention	613	58.8	1848	75.3
Treatment	140	13.4	504	20.5
Community Service	270	25.9	685	27.9
Suspension/Demotion	116	11.1	264	10.8
Increase Program Elements	162	15.5	323	13.2
Other	137	13.1	553	22.5

The overall graduation rate in this study for Kentucky Drug court is 29.8%. Table 7 shows the frequencies for the independent variables by graduation status. Looking at the frequencies, graduates appear to be slightly more female (41.5% versus 36.5%) as well as slightly more white (89% versus 83.3%), married (25.5% versus 16.6%) with at least a high school education (74.8% versus 48.6%) when compared to non-graduates.

The frequencies also suggest some patterns for problem behaviors. Those who graduate from drug court were more likely to indicate methamphetamines or other stimulants (25.2% versus 15.3%) as a drug of choice, although in turn, were less likely to

indicate cocaine/crack, marijuana, opiates, alcohol, sedatives, and other drugs. Graduates were almost twice as likely as non-graduates (20.8% versus 11.7%) to carry a charge related to the sale, trafficking, or manufacture of drugs. They were also more likely to have charges of drug possession (45% versus 34.2%) and DUI (7.6% versus 5.1%). On the other hand, those who graduated from drug court were less likely than non-graduates to carry charges against the administration of justice (8% versus 18.6%), public order (4.4% versus 6.2%), person (4.7% versus 7.7%), and property (18.4% versus 31.3%). Those who successfully completed drug court were more likely than non-graduates to enter into the program on a diversion track (34% versus 24.2%) with non-graduates therefore more likely to enter from probation. While in the program, those who graduated were less likely to indicate receiving an incarceration/detention sanction (58.8% versus 75.3%) and a treatment related sanction (13.4% versus 20.5%) than non-graduates. It should be noted that some of these differences are marked while others are slight. In addition, there seem to be minimal if any differences in the percent of graduates versus non-graduates by gender; charges related to traffic violations; and sanctions of community service, suspension/demotion, or increased program elements.

Variable selection. To determine which variables to include in the multivariate analyses, bivariate analyses were run to identify variables that are meaningfully related to program completion outcomes. A variable is considered meaningfully related to graduation status and included in later multivariate models if it met two criteria. First, the observed relationship must be statistically significant at $p = \leq .100$ in bivariate correlation tests. As suggested by Menard (2010), a relaxed p-value to reach statistical significance was used. The second criteria for variable selection is that the size of the

observed relationship must be at least small, showing a Pearson's *r* greater than or equal to +/- .100 as defined by Cohen's (1988) measure of effect size. This was done for diagnostic purposes and to accommodate for the power of the statistics associated with a large number of observations (N= 3,497). Moreover, one variable indicating issues with multicollinearity (VIF > 10, tolerance <.1, and r = +/-.5) was excluded. Table 8 shows the results of variable selection analyses.

Results from the variable selection process show that 13 of the 31 original variables are meaningfully related to drug court completion outcomes. Although prior research and theory was used to guide variable selection, bivariate correlation analyses were run to exclude variables not significantly related to the dependent variable to identify the most parsimonious set of predicator variables. Using the criteria to identify meaningful relationships ($p < .10$ and $r \geq (+/-) .1$), these bivariate analyses show that graduates and those who fail to graduate do not greatly differ in terms of race, gender, most drugs of choice and most sanctions.

Bivariate relationships between predictors. As several studies discussed in the literature review found significant relationships between independent variables, specific tests of relationships were conducted to determine if these same relationships are present for Kentucky Drug Court. To test these relationships, chi-square tests of independence were run between categorical variables while t-tests were used to test for differences regarding the continuous variable for age. The threshold for statistical significance is $\alpha = .05$.

Table 8
Variable Selection

Variable	Pearson's *r*	Sig.
Sex	-.047	.005
Age*	.216	.000
Race	.072	.000
Marital status*	.101	.000
Education*	.150	.000
Number drugs of	-.119	.000
Meth or other stimulant*	.117	.000
Cocaine/crack	-.054	.002
Marijuana	-.047	.005
Opiate	-.064	.000
Alcohol	-.034	.046
Sedative/downer	-.046	.006
Other	-.030	.080
Number charge types	-.016	.395
Drug sale/traffic/manu*	.119	.000
Drug possession*	-.102	.000
Vehicle/traffic	-.010	.547
Admin justice*	-.135	.000
Public order	-.035	.038
Person	-.055	.001
Property*	-.132	.000
DUI	.048	.005
Number of sanctions*	-.166	.000
Any incarceration*	-.165	.000
Any treatment sanction	-.084	.000
Any community service	-.020	.227
Any suspension sanction	.006	.742
Any increase program	.032	.061
Any other sanction*	-.108	.000
Track	-.101	.000
Months in operation*	-.102	.000
Time in program	.538	.000

*$p < .10$ and $r \geq (+/-)$ .1 and included in logistic regression model;
**removed for multicollinearity

Within the literature on drug court outcomes, a commonly cited relationship between predictor variables is between drug of choice and participant characteristics. In this current study, significant gender differences were found for marijuana, opiates, alcohol, and sedatives. Chi-square tests, using the continuity correction for two-by-two

tables, showed that males were significantly more likely to indicate marijuana, χ^2 (1, N =3,497) = 79.785, p = .000, and alcohol, χ^2 (1, N =3,497) = 42.016, p = .000, as a drug of choice than females. Females were significantly more likely to indicate opiates, χ^2 (1, N =3,497) = 8.756, p = .003, and sedatives, χ^2 (1, N =3,497) = 5.077, p = .024 than males.

Drugs of choice also showed racial differences. Chi-square tests, using the continuity correction for two-by-two tables, showed that whites were significantly more likely to indicate methamphetamines or other stimulants, χ^2 (1, N =3,497) = 82.868, p = .000, opiates, χ^2 (1, N =3,497) = 214.185, p = .000, and sedatives, χ^2 (1, N =3,497) = 52.535, p = .000, as a drug of choice than non-whites. Non-whites were significantly more likely to indicate cocaine, χ^2 (1, N =3,497) = 44.425 p = .000, marijuana, χ^2 (1, N =3,497) = 19.819, p = .000, and alcohol, χ^2 (1, N =3,497) = 19.960 p = .000, than whites.

Significant age differences were found for drug of choice. Independent samples t-tests show that participants indicating cocaine or crack, t(3495) = -6.745, p = .000, and alcohol, t(3495) = -2.156, p = .031, as a drug of choice were significantly older than participants who did not. Participants indicating marijuana, t(3495) = 9.705, p = .000, opiates, t(3495) = 6.420, p = .000, sedatives, t(3495) = 7.909, p = .000, and other drugs t(3495) = 3.896, p = .000, were significantly younger than those who did not.

Significant relationships are also found between drugs of choice and charges. The results of this current study showed that those indicating methamphetamine or other stimulant, χ^2 (1, N =3,497) = 11.659, p = .001, and those indicating opiates, χ^2 (1, N =3,497) = 6.664, p = .010, were more likely to carry a charge relating to the sale, trafficking, or manufacturing of drugs. Participants indicating cocaine were more likely

to carry a charge relating to the crime against a person than those not indicating cocaine, χ^2 (1, N =3,497) = 3.865, p = .049.

That certain drugs may be associated with a deeper involvement in criminal activity is further supported by other relationships with charge type. The tests of relationship here show that cocaine is the only drug of choice to show a significant relationship to charges related to crimes against a person. Methamphetamines or other stimulant as a drug of choice is significantly related to five charge types, more so than any other drug of choice; sale, trafficking, or manufacturing, χ^2 (1, N =3,497) = 8.326, p = .004, vehicle or traffic, χ^2 (1, N =3,497) = 5.325, p = .021, drug possession, χ^2 (1, N =3,497) = 18.945, p = .000, administration of justice, χ^2 (1, N =3,497) = 9.571, p = .002, and property crime, χ^2 (1, N =3,497) = 6.003, p = .014. The less "hard" drug types, specifically marijuana and alcohol are also related to the less intense charge types, such as possession and property crimes. However, offense severity is not directly explored in this study.

Multivariate Analyses: Logistic Regression

Several multivariate analyses were run using the variables that met selection criteria and excluding those that did not, as delineated in Table 9. First, Model I used a blocked enter logistic regression method to assess the predictive utility of the individual variables and to explore the predictive utility of each set of predictors to test the three hypotheses. Second, a forward stepwise logistic regression was run to determine the importance of each predictor to model performance. Third, the results of these logistic regression analyses warranted follow up analyses, which included an additional forward stepwise logistic regression to assess problematic variables identified in Model I and

Model II. A fourth full model using forward stepwise logistic regression method was run to assess the variable selection process and determine the presence of potential interaction effects.

Table 9
Variables Included and Excluded

Included	Excluded
Marital status	*Number drugs of choice
Age	Race
Education level	Sex
Methamphetamine or other stimulant	Cocaine/crack
Charge for sale, trafficking or manufacturing	Marijuana
Charge for drug possession	Opiate
Charge related to the administration of justice	Alcohol
Property crimes	Sedative
Number of sanctions	Other drug
Received any incarceration sanction	Number of charges
Received any other type of sanction	Any vehicle or traffic related charge
Drug court track	Any charge against to public order
Number of months program in operation	Any crime against a person
	Any DUI
	Any treatment or treatment related sanction
	Any community service sanction
	Any suspension sanction
	Any sanction that increased program elements

*removed due to multicollinearity

Model I: Enter logistic regression. A binary logistic regression model using a three-block enter method was run to isolate the effects of problematic behaviors and program performance from characteristics about the individual. At block one, participant characteristics, marital status, age, and education, were entered. This block was statistically significant, $\chi^2(3, 3{,}070) = 232.640$, $p = .000$ and showed a total percent correctly classified at 69.4%. The Hosmer and Lemeshow test of model fit showed a poor model fit, $\chi^2(8, 3{,}070) = 25.604$, $p = .001$. Nagelkerke's R square showed that these

variables accounted for 10.3% of the total variance. Table 10 shows the results of block one.

Table 10
Model I: Block 1

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Marital status	0.456	0.098	0.000	21.598	1	1.578
Age	0.051	0.005	0.000	119.760	1	1.053
Education	0.681	0.094	0.000	52.926	1	.1975

At block two, variables related to problem behaviors were entered to see if they provided predictive utility beyond participant characteristics. Methamphetamine as a drug of choice, charges for the sale, trafficking, and manufacturing drugs, charges for possession, charges related to the administration of justice, property charges, the number of sanctions, ever received a sanction for incarceration, and ever received an "other" sanctions were entered. As expected, this block was statistically significant, $\chi^2(8, 3070) = 262.184$, $p = .000$, and the model performed better and gained overall good model fit when variables representing participant problem behaviors were entered. The model was statistically significant, $\chi^2(11, 3{,}070) = 494.824$, $p = .000$ and correctly classified 72.9% of the cases. The Hosmer and Lemeshow test of model fit resulted in a good model fit, $\chi^2(8, 3{,}070) = 2.915$, $p = .940$. Nagelkerke's R square showed the variance predicted by the model more than doubled to 21.0% with the addition of these variables. Table 11 shows the results of the entering block two. The predictors that influenced the odds of graduating the greatest, identified by Exp(B), are level of education, carrying a charge related to the sale, trafficking or manufacturing of drugs, and carrying a charge related to the administration of justice.

Table 11
Model I: Block 2

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Marital status	0.396	0.104	0.000	14.578	1	1.486
Age	0.042	0.005	0.000	74.517	1	1.043
Education	0.755	0.098	0.000	59.335	1	2.127
Methamphetamine or other stimulant	0.472	0.105	0.000	20.203	1	1.603
Sale/trafficking/ manufacturing	0.502	0.117	0.000	18.275	1	1.652
Drug possession	0.332	0.093	0.000	12.641	1	1.393
Administration of justice	0.983	0.143	0.000	47.533	1	0.374
Property	-0.330	0.110	0.003	8.930	1	0.719
Number of sanctions	-0.052	0.016	0.001	11.435	1	0.949
Any incarceration sanction	-0.478	0.109	0.000	19.127	1	0.620
Any other sanction	-0.435	0.123	0.001	12.449	1	0.647

At block three, drug court variables were entered into the model. The number of months the drug court was in operation when the participant entered drug court and the track through which a participant entered were added. At block three, only modest gains in overall model performance were achieved. The overall model was statistically significant, $\chi^2(13, 3{,}070) = 565.125$, $p = .000$, and this block was statistically significant $\chi^2(2, 3{,}070) = 70.301$, $p = .000$. The addition of these two variables increased the percent of cases correctly classified to 73.1%; however, the Hosmer and Lemeshow test of model fit showed a poor model fit, $\chi^2(8, 3{,}070) = 20.792$, $p = .008$. Nagelkerke's R square showed that these variables accounted for 23.7% of the total variance. At block three, the model correctly predicted not graduating for 89.9% of the cases, but only correctly predicted 35.6% of those that graduated. See Table 12 for details of Model 1, block three. The predictors that influenced the odds of graduating the greatest, identified by Exp(B), did not change with the addition of these two variables.

The results for this model show that all variables significantly predict graduation outcomes, but earning at least a high school diploma slightly more than doubles the odds of graduation over those who do not have at least a high school diploma (p = .000, B = 0.717, ExpB = 2.049). Participants who carry a charge related to the sale, trafficking or manufacturing of drugs show an 67.7% increase odds of graduation (p = .000, B = 0.517, ExpB = 1.677), and those carrying a charge related to the administration of justice show a 53.9% reduction in the likelihood to graduate than those not carrying such a charge (p = .000, B = 0.878, ExpB = 0.461). Other factors positively related to graduation include age, marital status, indicating methamphetamine as a drug of choice, and carrying a charge related to drug possession. Other factors negatively related to graduation include, carrying a property crime charge, increases in the number of sanctions, receiving a sanction related to incarceration, entering drug court through the probation track, and increases in the time a drug court is in operation.

Table 12
Model I: Block 3

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Marital status	0.285	0.106	0.007	7.204	1	1.330
Age	0.049	0.005	0.000	93.039	1	1.050
Education	0.717	0.100	0.000	51.813	1	2.049
Methamphetamine or other stimulant	0.397	0.107	0.000	13.743	1	1.487
Sale/trafficking/ manufacturing	0.517	0.119	0.000	18.719	1	1.677
Drug possession	0.413	0.095	0.000	18.717	1	1.511
Administration of justice	-0.878	0.144	0.000	37.348	1	0.461
Property	-0.273	0.112	0.015	5.964	1	0.761
Number of sanctions	-0.063	0.016	0.000	15.760	1	0.939
Any incarceration sanction	-0.494	0.111	0.000	19.864	1	0.610
Any other sanction	-0.441	0.125	0.001	12.391	1	0.643
Track	-0.499	0.099	0.000	25.447	1	0.607
Months program in operation	-0.005	0.001	0.000	26.323	1	0.995

Model II: Forward stepwise logistic regression. Model II used a forward entry stepwise method, and resulted in final model performance identical to Model I, which is expected as the same variables were entered with unproductive variables omitted. The distinguishing feature and added valued of Model II is that having the order of entry determined by each predictor's individual contribution to model performance allows researchers to examine the relative importance of each variable. Of these 13 variables entered, age, having received a sanction for incarceration and the number of months the program was in operation were entered first, suggesting that these three variables are the most important predictors of drug court completion outcomes. Exp(B) results show that for every year increase in age of the participant at the time of entrance, the odds of graduating increase by 5.0%, that having received a sanction involving incarceration decreases the odds of graduating by 39.0%, and that for every month longer in operation the odds of graduating decreased by 0.5%. Carrying a charge related to the administration of justice was entered fourth and showed that the odds of graduation decreased by 58.4% for those carrying this charge type. Table 13 shows the results of the final step of the forward stepwise logistic regression in order of entry into the model.

Table 13
Model II Results

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Age	0.049	0.005	0.000	93.039	1	1.050
Any incarceration sanction	-0.494	0.111	0.000	19.864	1	0.610
Months program in operation	-0.005	0.001	0.000	26.323	1	0.995
Administration of justice	-0.878	0.144	0.000	37.348	1	0.416
Education	0.717	0.100	0.000	51.813	1	2.049
Drug possession	0.413	0.095	0.000	18.717	1	1.511
Number of sanctions	-0.063	0.016	0.000	15.760	1	0.939
Sale/trafficking/ manufacturing	0.517	0.119	0.000	18.719	1	1.677

Table 13 *(continued)*

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Track	-0.499	0.099	0.000	25.447	1	0.607
Methamphetamine or other stimulant	0.397	0.107	0.000	13.743	1	1.487
Any other sanction	-0.441	0.125	0.001	12.391	1	0.643
Marital status	0.285	0.106	0.007	7.204	1	1.330
Property	-0.273	0.112	0.015	5.964	1	0.761

Follow up Analyses

Analysis of the performance within Model I and the order of importance indicated by Model II suggest the presence of significant relationships between the drug court variables and the other predictor variables. Two sets of follow up tests of relationships were conducted. Since the drug court variables proved problematic, the first set of follow up tests focused on bivariate relationships between track and the variables significantly related to track and the length of time drug court was operational. A third forward stepwise model without track and time in operation was run to confirm the findings from the first two. The second set of follow up analyses was broader in focus and consisted of a fourth logistic regression using a full forward stepwise model to explore the possibility that the previous models excluded important and relevant variables.

Chi-square tests of relationships using the continuity correction for 2x2 tables were run to explore track and variables previously found related to track. Results show that the track through which one enters drug court is significantly related to carrying charges against the administration of justice, χ^2 (1, 3,497) = 46.541, p = .000, carrying charges related to drug possession, χ^2 (1, 3,497) = 7.276, p = .007, indicating methamphetamine or other stimulant as a drug of choice, χ^2 (1, 3,497) = 68.605, p = .003, and receiving an "other" type sanction, χ^2 (1, 3,497) = 15.003, p = .000. Those carrying

charges related to the administration of justice and those carrying drug possession charges were disproportionately among those entering drug court on the probation track, while those indicating methamphetamine as a drug of choice, and those having received an "other" sanction type were disproportionately among the diversion track. Half of these variables pull in the opposite direction as would be expected if they were to support the relationship between track and completion outcomes. Specifically, methamphetamine or other stimulant shows a positive relationship to completion outcomes while being overrepresented in the probation track, with the probation track showing a negative relationship with completion outcomes. Receiving an "other" type sanction shows a negative relationship to completion outcomes while disproportionately among those who entered through the diversion track, but those on the diversion track demonstrate an increase in odds of graduation. The opposing relationships may be a contributing factor in the decreased model fit observed in block three of Model I.

Since age was found related to the track through which one entered drug court and also the most important contributing factor in overall model performance, age was further assessed for relationships with variables related to track. Results from an independent samples t-test show that those entering through the probation track are, on average, significantly older than those entering through diversion. Those entering through probation track showed a mean age of 31.2 years and diversion 29.2 years, $t(2,860) = -20.708$, $p = .000$. Married participants, $t(3,324) = -9.958$, $p = .000$, participants who completed a high school degree, $t(3,219) = -6.160$, $p = .000$, those carrying charges related to the sale, trafficking or manufacturing of drugs, $t(3,495) = -3.709$, $p = .000$ and carrying charges related to drug possession, $t(3,495) = -5.875$, $p = .000$, are significantly

older. Participants carrying charges related to the administration of justice, $t(3,495) = 2.868$, $p = .004$, property crimes, $t(3,495) = -6.503$, $p = .000$, having received a sanction of incarceration, $t(3,495) = 5.978$, $p = .000$, and an "other sanction," $t(3,495) = 3.598$, $p = .000$, and those on the diversion track, $t(3,495) = -6.161$, $p = .000$ are significantly younger.

It is worth noting that of the predictor variables related to track, indicating methamphetamine or other stimulant as a drug of choice is the only variable that failed to show significant differences with age, $t(3,495) = -1.798$, $p = .072$. Participants carrying a charge related to drug possession were, on average, older (31.79 years) than those who did not (29.98 years), $t(3,495) = -5.875$, $p = .000$. Participants carrying a charge related to the administration of justice were, on average, younger (29.68 years) than those not carrying such a charge (30.83 years), $t(3,495) = 2.868$, $p = .004$. Participants with an "other" type sanction are, on average, younger (29.60 years) than those who do not (30.92 years), $t(3,495) = 3.598$, $p = .000$. The opposing nature of the relationships between track and variables related to track and completion outcomes suggests the presence of noise within the model, which may explain the observed reduction in overall model fit while still contributing to overall model performance.

An independent samples t-test was run between the time a drug court was in operation and the track through which one entered drug court to determine if these two variables are related to each other. The results were statistically significant, with those entering through the probation track, on average, having entered drug court in programs that were in operation significantly longer, $t(2,860) = -20.708$, $p = .000$. On average, drug courts were in operation for 74.4 months for those entering through the probation

track, while only 46.5 months for those on the diversion track. These relationships may help explain the decreased odds of graduating for those entering through the probation track. Age shows a small, but statistically significant positive correlation with time in operation (r = 0.073, p = .000), which is in the opposite direction if age were to support explanation of a decrease in the odds of graduation the longer a program is in operation. These results for these two relationships also suggest that including length of time a drug court is in operation produces noise within the model.

An additional forward entry stepwise logistic regression, Model III, was run without the drug court variables to assess the suspicion of contributing to noise within the model. Of these 11 variables, age, having ever received a sanction for incarceration, and carrying a charge related to the administration of justice (which was previously fourth) were the first three variables entered, suggesting that these three variables are the most important predictors of drug court completion outcomes. The only change in the top three predictors from Model II to Model III is the absence of the drug court variable for time program is in operation. See Table 14 for results of this confirmatory model.

Table 14
Model III: Confirmatory Stepwise Model

Independent Variables	*B*	*S.E*	*Sig.*	Wald	*df*	*Exp(B)*
Age	0.042	0.005	.000	74.195	1	1.043
Any incarceration sanction	-0.480	0.108	.000	19.793	1	1.619
Administration of justice	-1.009	0.141	.000	51.191	1	0.365
Education	0.751	0.097	.000	60.265	1	2.118
Property	-0.354	0.109	.001	10.584	1	0.702
Methamphetamine or other stimulant	0.490	0.104	.000	22.340	1	1.632
Any other sanction	-0.427	0.122	.000	12.292	1	0.653
Marital Status	0.388	0.103	.000	14.273	1	1.474
Sale/traffic/manufacture	0.481	0.116	.000	17.115	1	1.617
Number of sanctions	-0.050	0.015	.001	10.559	1	0.952
Drug Possession	0.295	0.092	.001	10.253	1	1.343

Note: the variables are listed in order of importance, highest to lowest, in contributing to overall model performance.

Because of overarching concerns with interaction effects between predictors and the exclusion of potentially useful variables during variable selection process, a full stepwise logistic regression model was run with 30 of 31 variables under study included. The variable for the number of drugs of choice was excluded due to multicollinearity. Table 15 shows the results of the full forward stepwise model.

As expected, with all variables under study entered, the model was statistically significant, $\chi^2(20, 2{,}484) = 557.544$, $p = .000$ and correctly classified 75.2%. This exploratory model retained 20 of the 30 variables entered and correctly classified not graduating 90.1% and 42.2% for those that graduated. Nagelkerke's R squared shows that this model accounted for 28.3% of the total variance. These figures show improvement in overall classification accuracy and the amount of variance explained over the previous models. However, the Hosmer and Lemeshow test of model fit showed a poor model fit, $\chi^2(8, 2{,}484) = 27.007$, $p = 0.001$ and across the majority of variables, the standard errors increased in comparison to the standard errors from both Model II and Model III. Of these 30 variables, age, the number of sanctions, and carrying a charge related to the administration of justice were the first three variables entered, suggesting that these three variables are the most important predictors of drug court completion outcomes.

The results from this model show that the top five predictors across all models are relatively stable. Age, and carrying a charge related to the administration of justice are consistently within the top three predictors. Variables for education and carrying property crime charges changed positions in order of importance between Model III and Model IV, but both consistently remained in the top five predictors. Nevertheless, this exploratory model elevated the importance of the number of sanctions to the second most

important predictor whereas it was ranked 7 of 13 variables in Model II and 10 of 11 in Model III. Moreover, eight of the previously excluded predictors emerged as contributing to model performance (race, indicating drugs of choice for alcohol or opiates, carrying charges related to crimes against a person or DUI, sanctions involving an increase in program elements, suspension, or community service). One predictor that was previously found meaningfully related and predictive of completion outcomes was dropped from the model (carrying a charge related to drug possession). Table 16 describes the state of the variables when examined across all the models. These results suggest the presence of interaction effects among predictor variables.

Table 15
Model IV: Full Model, Forward Stepwise

Independent Variables	B	S.E.	Sig.	Wald	df	Exp(B)
Age	.051	.006	.000	77.450	1	1.053
Number of sanctions	-.145	.024	.000	37.809	1	.865
Charge administration of justice	-.887	.149	.000	35.213	1	.412
Charge property crime	-.531	.119	.000	19.886	1	.588
Education	.658	.112	.000	34.551	1	1.931
Increase programming sanction	.843	.156	.000	29.053	1	2.323
Months in operation	-.003	.001	.016	5.782	1	.997
Methamphetamine/other stimulant	.523	.126	.000	17.351	1	1.688
Charge crime against person	-.660	.202	.001	10.723	1	.517
Other sanction	-.498	.148	.001	11.261	1	.608
Incarceration sanction	-.366	.127	.004	8.295	1	.694
Drug of choice alcohol	-.283	.110	.010	6.640	1	.753
Track	-.421	.118	.000	12.809	1	.656
Community service sanction	.376	.131	.004	8.222	1	1.456
Drug of choice opiate	-.389	.105	.000	13.685	1	.678
Marital Status	.313	.122	.011	6.542	1	1.368
Suspension sanction	.417	.169	.014	6.092	1	1.517
Race	.345	.159	.030	4.726	1	1.412
Charge sale/traffic/manufacture	.348	.131	.008	6.994	1	1.416
Charge DUI	.446	.190	.019	5.548	1	1.563

Table 16
Comparison of Model Predictors

Included in all models	Excluded in all models	Emerged in full model	Dropped in full model
Age	Sex	Race	Drug possession
Marital Status Education	Drug of choice marijuana	Drug of choice opiate	
Charges Admin justice	Charges public order	Drug of choice alcohol	
Charges property crime	Drug of choice other	Suspension sanction	
Number of sanctions	Number of charges	Increase program elements	
Other sanction	Charges vehicle/traffic	Charges DUI	
Incarceration sanction	Drug of choice cocaine/crack	Crime against person	
Track		Community service sanction	
Months in operation			
Charges sale/trafficking/ manufacturing			

Results of Hypothesis Tests

To test the hypotheses in this study, the variables were examined two ways. First, bivariate relationships between individual predictors and the outcome variable were examined. Second, individual contributions to model performance were assessed. To reject the null hypothesis, at least one variable tested in each hypothesis must be meaningfully related, reliably predict program completion outcomes, and contribute to overall model performance when in the presence of the other variables. Bivariate correlations were used to identify meaningful relationships and used for variable selection. Multivariate logistic regression was used to assess the ability to predict drug court completion outcomes and individual contribution to model performance. In the following sections, the results of the each hypotheses are described, followed by the results for each predictor under study.

Hypothesis one. Reject the null hypothesis. Participant characteristics predict Kentucky Drug Court completion outcomes, with age and level of education among the strongest of all predictors studied. Not every participant characteristic tested in this study

was meaningfully related to drug court completion outcomes. Only age, marital status, and education showed a meaningful relationship to the outcome variable and were therefore entered into the logistic regression model. Several of the results are not in the expected direction of the predictions offered and an increased-responsibilities argument was not supported. Race and sex failed to show a relationship with the outcome variable, while older and married participants showed an increased likelihood of graduation. The prediction that not having at least a high school diploma is associated with a decrease in the odds of graduation is supported.

Participant characteristics alone predicted drug court completion outcomes, but not as well as when other variables were included. The results with only participant characteristics entered (Model I, block 1) shows a poor model fit and approximately 10% of the variance explained. All three variables remained significant predictors when the blocks for problem behaviors and drug court variables were entered. These additional variables resulted in greatly improved model performance and variance explained. Level of education produced the strongest influence over changes in the odds of graduation, even after the addition of the other variables under study. Refer to Table 10 to view the results of the model with only participant characteristics involved, Table 11 for results when problem behaviors were entered, and Table 12 for results when the drug court variables were entered. In Model II, a forward stepwise logistic regression with all 13 variables entered, level of education showed the strongest influence on the odds of graduation and age was the most important individual contributor for predicting completion outcomes. Refer to Table 13 to view results of the forward stepwise logistic regression model, which shows the variables in order of importance. Model IV, a full

forward stepwise logistic regression including 30 out of all 31 variables, showed that participant characteristics of age, education, marital status and race all predict completion outcomes.

Sex. Although initial examination of graduation status by sex appears to show a slight differences between graduates and non-graduates (41.5% of graduates were female compared to 36.5% of non-graduates), the tests for variable selection showed that sex was not meaningfully related to program completion outcomes (p = .005, r = -.047). Sex was therefore not included in the logistic regression analysis used for hypothesis testing. Model IV, which included all variables of interest without respect to variable selection criteria, showed that sex was not a significant predictor of completion outcomes.

Age. Initial analysis of data between graduates and non-graduates showed that the mean age of graduates, 33.5 years, was older than non-graduates, 29.4 years. Age was found meaningfully related to program completion outcomes in variable selection tests (p = .000 , r = .216) and a significant predictor in all models. In all stepwise logistic regression models, age was found to be the most important predictor, evidenced by being entered into the model first. The results show that for every one year increase in age the odds of graduation increase by 5.0% (p = .000, B = .049, ExpB = 1.050). The older the participant, the more likely he or she is to graduate.

Race. Although initial examination of graduation status by race appears to show a slight difference between graduates and non-graduates (89.0% of graduates were white compared to 83.3% of non-graduates), initial tests for variable selection showed that race was not meaningfully related to program completion outcomes (p = .000 , r = .072). Race was therefore not included in the logistic regression analysis used for hypothesis

testing. However, in Model IV, which included all variables of interest without respect to variable selection criteria, race emerged as a significant predictor of completion outcomes. Although race was retained as a statistically significant predictor, it was among the least important of predictors (entered 28 of 30 variables.)

Marital status. Initial examination of graduation outcomes by marital status shows some differences between graduates and non-graduates (25.5% of graduates were married compared to 16.6% of non-graduates). Marital status was found meaningfully related to program completion outcomes (p = .000 , r = .101) and results from the multivariate analyses showed that marital status reliability predicted program comes (p = .000, B = .285, ExpB = 1.330). These results show that being married increased the odds of graduation by 33.0%. The results of Model II, which included only meaningfully related variables, and Model IV, which included all variables without regard to any statistical variable selection, showed that marital status is one of the least important predictors, entered at step 12 of 13 steps and 26 of 30 steps respectively.

Education. Initial examination of graduation status by education shows a striking difference between graduates and non-graduates in education level. Of graduates, 74.8% indicated having earned at least a high school diploma or equivalent compared to 48.6% of non-graduates. Education was found meaningfully related to program completion outcomes in variable selection tests (p = .000 , r = .150) and also reliability predicted program completion outcomes (p = .000, B = 0.717, ExpB = 2.049). Results show that participants indicating the completion of at least a high school diploma or equivalent were 104.9% more likely to graduate from drug court than those with less than a high school diploma. Level of education, of all the predictor variables, exerts the strongest

change in the odds of graduation and was also among the top contributing variables, in the forward stepwise models. However, this variable may be a proxy for graduation, as participants who do not possess at least a high school diploma or its equivalent at the time of entrance are required to work on education while in the drug court program.

Hypothesis two. Reject the null hypothesis. Knowing participants' problem behaviors leading into the drug court program is useful for predicting completion outcomes. Initial examination of completion outcomes by these problem behaviors shows slight differences between graduates and non-graduates for most of the variables under study. Indicating methamphetamine or another stimulant was shown to be meaningfully related and reliably predict outcomes, along with possessing charges for the sale, trafficking or manufacturing of drugs, drug possession, charges related to the administration of justice, and property crimes. Having received a sanction involving incarceration or detention, or an "other" type sanction was also shown to reliably predict completion outcomes. Carrying charges relating to the sale, trafficking, or manufacturing of drugs and carrying charges related to the administration of justice exerted the second and third strongest effects on changes in the odds of graduation.

Similar to hypothesis one, several of the results are not in the expected direction. The prediction that those with harder drugs, specifically cocaine or crack and opiates, was not supported as a relationship with completion outcomes was not found. This study failed to support predictions regarding a decreased likelihood of graduation for participants carrying crimes against people or crimes for the sale, trafficking or manufacturing of drugs. The results show a relationship between carrying a property crime charge and completion outcomes in some analyses. Carrying a charge for the sale,

trafficking or manufacturing of drugs resulted in an increase in the odds of graduation. The prediction regarding the number of drugs of choice could not be tested due to problems with multicollinearity. The results of this study support the prediction that jail sanctions are associated with decreased odds of graduation.

Adding variables for problem behaviors into the model (Model I, block 2) resulted impressive gains in model performance. The amount of variance explained with these additional variables more than doubled to 21.0% and resulted in a good model fit. Overall model accuracy increased by 3.5 percentage points by adding these variables. According to the forward stepwise model, receiving a sanction involving incarceration and carrying a charge related to the administration of justice were among the most important predictors. Specific findings for these variables are outlined below.

Drugs. Only one drug of choice, methamphetamine and other stimulants, was found meaningfully related to completion outcomes (p = .000 , r = .117). Results of the multivariate analyses show that participants indicating methamphetamine or other stimulant as a drug of choice are 48.7% more likely to graduate from drug court than those who did not (p = .000, B = 0.397, ExpB = 1.487). This variable was entered 10 of 13 in the forward stepwise logistic regression model. The remaining drug of choice types, cocaine or crack (p = .002 , r = -.054), marijuana (p = .005 , r = -.047), opiates (p = .000 , r = -.064) alcohol (p = .046 , r = -.034), sedatives (p = .006 , r = -.046), and other types of drug (p = .080 , r = -.030) were not meaningfully related to drug court completion outcomes and therefore not included in the multivariate analyses used for the tests of hypotheses.

The number of drugs of choice, although it showed a meaningful relationship with the completion outcome (p = .000 , r = .119), was not included in the multivariate analyses due to evidence of multicollinearity. The number of drugs of choice showed a variance inflation factor greater than ten and a strong relationship to the sedative as a drug of choice (p = .000, r = .604). The number of drugs of choice was therefore not included in the multivariate analyses.

Crime. Four of the original nine charge types studied here were found meaningfully related to drug court completion outcomes. Carrying a charge against the administration of justice (p = .000 , r = .135), the sale, trafficking, or manufacturing of drugs (p = .000 , r = .119), drug possession (p = .000 , r = .102), and property crime (p = .000 , r = -0.132) were meaningfully related to drug court completion outcomes. All four of these variables also reliably predicted completion outcomes. Carrying a charge relating to the administration of justice decreased the odds of graduating by 58.7% when compared to those who do not (p = .000, B = -0.878, ExpB = 0.413). Across all four models, this variable is the strongest predictor of the charge types, the fourth most important variable in contributing to overall model performance, and the fourth strongest influence on odds of graduation. Carrying drug possession charge type increased the odds of graduating by 51.1% over those who do not (p = .000, B = .413, ExpB = 1.511) and was entered sixth of 13 variables in the forward stepwise logistic regression. Charges relating to the sale, trafficking or manufacturing of drugs resulted in a 67.7% increase in the likelihood of graduating drug court over to those who did not (p = .000, B = 0.517, ExpB = 1.677), revealing that this charge type exerts the second strongest influence on changes in the odds of graduation. This charge type was entered eighth of the 13

variables in Model II, the forward stepwise model. Carrying charges related to property crimes resulted in a 23.9% decrease in the odds of graduating (p = .015, B = -0.273, ExpB = 0.761). The forward stepwise logistic regression showed that the property crime charge type is the least important of the 13 variables in contributing to overall model performance.

Charges relating to vehicle or traffic offenses (p = .547 , r = -0.010), charges relating to crimes against public order (p = .038 , r = -0.035), charges relating to crimes against a person (p = .00 , r = -0.055), and DUI charges (p = .005 , r = 0.048) failed to meet the inclusion criteria; therefore they were excluded from the logistic regression analyses for the test of hypotheses.

The number of charges a participant possess at the time of entry was not found meaningfully related (p = .395 , r = -.016) and therefore excluded from the multivariate analyses for the test of hypotheses.

Sanctions. Three of the seven variables related to drug court sanctions showed meaningful relationships to drug court completion outcomes. Having received a sanction involving incarceration or detention (p = .000, r = -0.165) or having received an "other" type sanction (p = .000, r = -0.108), and the number of sanctions a participant received while in drug court (p = .000 , r = -0.166) were meaningfully related to the outcome. All three of these variables reliably predicted drug court outcomes. Having received a sanction involving incarceration or detention significantly decreased the odds of graduating by 39.0% compared to those who did not receive such a sanction (p = .000, B = -0.494, ExpB = 0.610). The results of the forward stepwise logistic regression show that having received a sanction involving incarceration or detention is the second most

important variable in contributing to overall model performance. Having received an "other" type sanction decreased the odds of graduation by 35.7% compared to those who did not (p = .000, B = -0.441, ExpB = 0.643). Each additional sanction received decreased the odds of graduation by 6.1% (p = .000, B = -0.063, ExpB = 0.939).

The remaining sanction types, treatment or treatment-related sanctions (p = .000, r = -0.084), community service sanctions (p = .227, r = -0.020), suspension or demotion sanctions (p = .742, r = 0.006), and increased program elements (p = .060, r = 0.032) failed to show meaningful relationships with drug court completion outcomes and were excluded from multivariate analyses to test the hypotheses.

Hypothesis three. Reject the null hypothesis. Both the track through which a participant enters drug court and the time a program is operational are meaningfully related to completion outcomes, reliability predict completion outcomes, and increase, although slightly, overall model performance. The prediction that entering through the diversion track results in an increase in the odds of graduating is supported. The results show a negative relationship between in the amount of time a drug court is in operation and completion outcomes. The forward stepwise logistic regression model shows that the number of months the program is in operation is the third most important variable contributing to model performance.

While this null hypothesis is rejected, including these variables in the presence of participant characteristic and problem behaviors resulted in only modest gains in model performance and ultimately a poor fitting model. Nagelkerke's R shows that the amount of variance explained increased by less than three percentage points, and overall model accuracy increased by approximately one percentage point. These findings suggest that

although these two variables reliability predict completion outcomes, they negatively influence the overall fit of the model to the data, possibly resulting from relationships or interactions among other predictor variables. Results of the specific tests for these two variables are outlined below.

Track. Track was found related to program completion outcomes in variable selection tests (p = .000, r = -0.101) and demonstrates that entering drug court through the probation track decreased the probability of graduating by 39.3% when compared to those entering through the diversion track (p = .000, B = -499, ExpB = 0.607) and was entered ninth of 13 variables in the forward logistic regression model, Model II.

Time program in operation. Time in operation was shown to be meaningfully related to completion outcomes (p = .000 , r = -0.100), and the likelihood of graduating decreased by 0.5% for every month increase a program has been in operation (p = .000, B = -0.005, ExpB = 0.995). The forward stepwise logistic regression results show that the time the drug court has been in operation is the third most important variable contributing to model performance.

Summary

Based on results across models, the top predictors for Kentucky Drug Court completion outcomes are age, level of education, carrying charges related to the administration of justice, the number of sanctions one receives and receiving a sanction for incarceration. To arrive at this conclusion, the results from all models and the consistency of the results across all models were explored. Two sets of analyses were run. First, bivariate analyses were run to describe the population under study and assess all variables of interest for inclusion into the model. For variable inclusion the tests for

statistical significance relied upon a relaxed alpha value, $\alpha = .10$, supplemented by a Pearson's *r* value of at least +/- .1. This method was used to identify variables that were meaningfully related to the outcome variable. Bivariate tests of relationships among predictor variables were also run to determine if Kentucky Drug Court data also showed relationships between predictor variables as found in previous studies and also test for multicollinearity. Variables tested in this step showed significant relationships, but only one variable showed signs of multicollinearity. When assessing analyses between predictor variables, a Pearson's *r* of +/- .5, VIF >10 and tolerance score <.1 were used as the criteria for multicollinearity. One variable, the number of drugs of choice, was removed for that reason.

Second, after variable selection was complete, multivariate analyses were run to determine a set of predictors for drug court completion outcomes. Variables that were meaningfully related and not collinear with other predictors were entered into an enter method logistic regression model. Model I suggested issues with the inclusion of the drug court variables, time in operation and track. To determine the importance of each predictor, a forward stepwise logistic regression model, Model II, was run. Since the results of Model I showed poor overall performance at the final block and suggested that the drug court variables created excessive noise within the model, an additional forward stepwise logistic regression, Model III, was run without the drug court variables. Identical to Model I, block II, this model showed a good model fit. This confirmed that the drug court variables are problematic. The level of importance among the variables between Model II and Model III did not change significantly, showing that these variables did not interact in a major way for the top performing variables. A fourth

stepwise logistic regression with all variables under study was run to examine the possibility that important and relevant variables were excluded as the result of the variable selection process. With all variables entered, 20 of the 30 variables were retained and resulted in increased in model accuracy and variance explained. The full forward stepwise model resulted in a poor fitting model, which suggests that the model is noisy. Eight previously excluded variables emerged as significant contributors to model performance, and one variable was dropped as a predictor. The top predictors were generally the same as in previous models, but with the number of sanctions greatly elevated in the order of importance. This suggests that reducing the variables during the bivariate selection process did not influence the level of importance across the top predictors in a major way. However, variable selection practices excluded predictors that may be important to understanding drug court outcomes, and included a predictor that may not be as important to predicting outcomes as thought given the results of the bivariate analyses. These results point to interaction effects between predictor variables.

CHAPTER V
DISCUSSION

Understanding drug court completion outcomes is important for understanding if, how, and for whom drug court may work for reducing both recidivism and relapse. Post program completion studies that seek to understand the impacts of drug court but are based on graduates include only a select group of individuals. It is quite possible that those who successfully pass through drug court differ in very significant ways from those who do not. After all, those who graduate show evidence of success at staying sober and behaving in socially acceptable ways, otherwise, they would not graduate. Using Kentucky Drug Court data, all of the hypotheses tested in this study were supported. There are qualities about participants, their problem behaviors, and drug courts that differentiate between graduates and those who fail to graduate.

Summary of Findings

The purpose of this study is to identify factors related to drug court program completion outcomes using data obtained from Kentucky Drug Court. The research question for this study is answered and, in general, is consistent with results of prior studies. Some findings, however, were unexpected while others are new additions to the literature. Of the original 31 variables included for study, 13 were meaningfully related and predictive of completion outcomes. Of participant characteristics, age, education, and marital status were related to and predictive of completion outcomes. Methamphetamine

or other stimulant for a drug of choice was the only drug of choice types related to and predictive of completion outcomes. Several charge types were found related to and predictive of completion outcome, specifically, charges relating the sale, trafficking, or manufacturing of drugs, drug possession, administration of justice, and property crimes. Having received a sanction involving incarceration or "other" types, as well as the number of sanctions, were also related and predicted outcomes. Both drug court variables, the track through which on entered drug court and how long a drug court was in operation, were also related and predictive, although problematic when entered into models with other drug court variables.

Factors predictive of drug court completion outcomes were found to be related to each other, causing the nature of these relationships to be complex. For example, age was found to be the most important variable contributing to model performance across all models. Age was also found significantly related to a number of other predictor variables, time in operation and the track through which one enters drug court. The drug court variables individually contributed to the prediction of outcomes, but when included with other drug court variables, caused model performance to drop and ultimately poor fitting models. Tests of relationships revealed that age was significantly related to drug court program variables, but in the opposite direction if they were to support the observed relationship between drug court program variables and drug court completion outcomes. Tension between predictor variables was also found for relationships between charge type, sanctions, and track and completion outcomes. Given these findings, and considering that including drug court variables resulted in decreased model performance, drug court variables were determined to add noise into the model. Drug court completion

outcomes, when identifying a set of predictors, are better predicted in the absence of these variables.

Because of the complexity of the relationships between the variables under study, the suspicions of interaction effects, and the exclusion of potentially relevant variables, an exploratory forward stepwise model was run. The changes in the order of importance and changes in odds ratios between all models confirmed the presence of interaction effects and also pointed to the presence of mediating and/or moderating variables, further demonstrating the complexity surrounding both prediction techniques and factors leading to successful completion of drug court.

However complex, some stability in predictors was found. Across all four of the models run for this research, the top predictors were relatively stable and include mainly participant characteristics and problem behaviors; age, education, carrying charges related to the administration of justice or property crimes. However, two sanction-related variables fluctuate in levels of importance. Both receiving an incarceration sanction and the number of sanctions received arrived within the top two predictors but in different models, suggesting that they are both important to understanding outcomes, but that they also interact with other variables.

Response to the Research Question

Prior studies suggest that demographic factors such as race, sex, marital status, age, education, and employment are related to completion outcomes. Of those factors, the current study found that marital status, age, and education predicted program completion. Analyses show that being married, being older, and having at least a high school diploma makes graduation predictably more likely. That race and sex were not found related to

program completion in bivariate tests is an operationally significant finding. This study found that sex was neither meaningfully related to nor predictive of completion outcomes in any of the analyses. These findings are contrary to the increased-responsibilities argument offered in the statement of the hypotheses. This shows that there are no direct detectable patterns or relationships between sex and outcomes, which suggests that programming may be equally effective between males and females. This may also suggest that Kentucky Drug Court has effectively adapted programming around perceived barriers associated sex. On the other hand, that race was not meaningfully related in bivariate tests of relationships but emerged as a significant predictor in the full forward stepwise model, although not among the strongest of predictors, suggests that race may play an important part in understand outcomes for Kentucky Drug Court, but through the interactions with other variables.

The findings regarding participant characteristics and drug court completion outcomes could support a social bond perspective (Sampson & Laub, 1993). This perspective suggests that patterns in criminality and conformity change throughout the life course. Important to this study, a social bond perspective suggests that criminal trajectories can be interrupted. One way this perspective sheds light on the findings is that those who do well in drug court may have more social capital than those who do not do well. The bonds associated with marriage and education may be important enough to the participant that the costs and consequences of failing drug court extend beyond just conviction and incarceration, but ultimately include the loss of the bond. In essence, both marriage and education represent stakes in conformity that the participant may not want to risk losing.

Another way Sampson and Laub's adult social bond perspective explains the findings is that drug court set the context for changes in criminal trajectories; drug courts are turning points. Perhaps those who enter drug court who are also married or educated are at a threshold between conformity and criminality but currently on the trajectory of criminality. Drug court's influence for these participants is toward conformity, possibly helping participants see the value of those adult social bonds.

Perhaps both marriage and education are an artifact of age, therefore also explaining why age is the single most important predictor of completion outcomes. It could be that selection process for drug court results in the selection of those who are in the process of aging out of criminal behaviors anyway. This explanation is in line with Moffitt's (1993) theory regarding adolescent-limited offending. However, in Moffitt's theory, life course persistent offenders comprise a minority of the individuals involved in criminal behaviors. In this study, the overall graduation rate is less than 30%. If Moffitt's theory is a viable explanation for the findings, this suggests that an age-crime curve for drug court participants is wider than a general age-crime curve and/or that drug court also serves a large proportion of life course persistent offenders.

The current research also finds that criminal charges, sanctions, and drugs of choice show utility for predicting completion outcomes, but further study is needed as these relationships may be associated with level of risk, which was not measured here. Drugs of choice inform upon drug using behavior, charge types inform upon criminal behavior, and sanctions provide a look into a participant's ability to comply with program rules. These are the concerns of drug court: drugs, crime, and compliance. These

behaviors are at the core of the drug court program. That they are related to each other and to drug court outcomes is not a surprise.

The lack of significant findings across the majority of drugs of choice suggests that Kentucky Drug Court is effective for managing a broad range of drug addictions, or perhaps considering that the overall graduation rate is less than 30%, that Kentucky Drug Court is equally ineffective across the majority of the drug types. That methamphetamine or other stimulants was the only significant drug of choice predictor for completion outcomes suggests that methamphetamines or other stimulants pose a unique concern for Kentucky Drug Court. However, this relationship is positive, meaning that those indicating methamphetamine or other stimulant show increased likelihood of graduating. Only 18.3% of the population under study indicated a problem with this drug type, making it the second least prevalent drug type indicated. Tests of relationships with methamphetamine or other stimulant as a drug of choice failed to show a significant relationship with age, which excludes an aged-based explanation for this specific finding.

Test of relationships, however, showed a significant relationship between methamphetamine or other stimulant as a drug of choice and the sale, trafficking, and manufacturing of drugs. This finding is not unexpected as the use of methamphetamine could logically be associated with the sale, trafficking, and manufacturing of methamphetamine. The interesting observation is that both these variables show a positive relationships with completion outcomes, which could be seen as contrary to the risk principle if one views the sale, trafficking and manufacturing of drugs a crime indicative of a deeper involvement in crime than other charge types such as traffic and motor vehicle offenses, and property crimes. Maybe participants indicating this drug type

are actually less risky and less involved in a criminal lifestyle than previously thought. Alternatively, maybe Kentucky Drug Court's programming is more effective for those with problems with methamphetamine or other stimulant than the other drug types. Further investigation is warranted to explain these findings.

This study also explored various charge types to determine if certain kinds of charges are associated with completion outcomes. That carrying a charge related to the administration of justice is the strongest predictor among all the charge types and in the top three strongest of all predictors while charges relating to the sale, trafficking, and manufacturing is among the bottom half in variable importance is unexpected and counter to arguments regarding level of risk. As discussed in the previous paragraphs, carrying a charge related to the sale, trafficking, and manufacturing of drugs is associated with a 62.6% increase in the odds of program graduation. When considering that charge types may represent a relative level of risk, crimes such as the sale, trafficking, and manufacturing of drugs or crimes against a person could be indicative of a higher degree of risk. Subsequently, these charge types should be strongly and negatively associated with outcomes. Risk principle would also suggest that crimes against the administration of justice are relatively minor. After all, one could argue that the kinds of bad acts in that charge type do not result in physical, financial, or emotional harm to a person or the propagation of other criminal behaviors. However, this study found the opposite: that carrying charges related to these bad acts results in worse outcomes. Individual crimes such as probation/parole violations, fleeing or evading a police officer, failing to appear in court, and tampering with evidence are included in the category for crimes against the administration of justice. This may suggest that a pattern of behavior relating to

violations against the administration of justice or general issues with authority continues within drug court, and that this type of behavior poses a greater risk to program performance than the behavior involved in crimes against people or property.

The influence of sanctions also proved worthy of note. First, receiving a sanction of incarceration significantly changed the odds of program completion, but receiving a sanction related to treatment did not. Participants may receive treatment as a program requirement and treatment as a form punishment differently. Distinguishing the impact of treatment as a programming requirement from treatment as a sanction would be challenging. Given that receiving an incarceration sanction resulted in a decreased odds of graduation, perhaps incarceration is accepted and received as punishment while treatment as a form of punishment confuses the purpose. No predictions were made on the effects of sanctions involving treatment, as it is unstudied in the literature. Treatment as a form of punishment warrants further study.

The fact this current study is not the first to find a negative relationship between outcomes and receiving a jail sanction (see Belenko, 2001) may suggest that incarceration is contraindicated for the drug-addicted population. Although Walter Reckless's containment theory was met with much criticism (see Cullen & Agnew, 2003), maybe these concepts or parts of the theory warrant a revisit. Drug court participants arrive in drug court with behavioral evidence that their "controls" are compromised; they are involved in both crime and drug abuse. Drug court can be viewed as a reinforcing the outer control system and, when taken out of this reinforcing system and placed into a criminogenic one, incarceration "pushes" a participant back on the trajectory of criminality. Those who do not receive incarceration do not experience that

"push," also explaining why those who do not receive this sanction are more likely to graduate.

Nearly 20% of the population under study received a sanction documented as "other" and receiving a sanction documented as "other" decreased the odds of graduating from drug court by 35.0%. "Other" is not defined and therefore cannot be explained. Perhaps these other sanctions are creative or non-traditional sanctions that do not fit well into the other categories. If this is the case, then these creative sanctions, when assessed across all Kentucky Drug Courts, may not be effective at deterring future non-compliance or that these sanctions may be stigmatizing. Future research should attempt to flesh out what qualities about this "other" type of sanction may produce the decreases in likelihood of graduation.

There are two issues to take into account about the sanction variables. First, data entry of sanctions is generally inconsistent, but appears to be more consistent for severe sanctions. Comparing sanctions involving incarceration with all the other sanction types may not be appropriate. Second, the incarceration sanction variable may represent official reactions to severe non-compliance while the other type sanctions represent official reaction to less severe non-compliance. If this is the case, then the findings suggest that severe non-compliance coupled with a severe sanction results in negative outcomes. What would happen if severe non-compliance was met with something other than a severe sanction? If the goal of drug court is to keep a participant out of jail and prison because the drug abuse is the root cause, and drug court is offered in the hopes that the resultant negative consequences of jail and prison never occur, then using jail as a sanction may defeat the purpose.

Studying the influence of the drug court itself, in terms of track and time in operation, is a new addition to the literature. That probation is associated with a decreased likelihood of graduation when compared to diversion may suggest that the threat of a prison or jail stay may not be effective at producing compliance. Since those on the diversion track risk receiving both a conviction and the imposition of a prison or jail term, while those on the probation track already experienced the conviction, it is possible that avoiding the conviction is important enough to encourage compliance. However, those on the diversion track may also carry a lower level of general risk to begin with, suggesting that they are more successful because they are less risky. This may also suggest that this population could perform just as well with less intense supervision. This finding warrants further investigation to determine causal factors between track and completion outcomes.

This study also found that the longer a drug court is in operation the lower the likelihood of graduating. This begs the question, what about drug court's operations over time might decrease the odds of graduation? It is possible that as drug courts opened, staff and leadership were hesitant to terminate a participant and over time, this hesitancy declined? Perhaps, as noted in the literature review, the drug court increasingly began to accept higher risk participants, who are more likely to be terminated. In this respect, the decrease in graduation rates could be due to the increase in acceptable level of risk for entry into drug court. However, further study is needed to explore the operational impacts of the drug court program on completion rates and possible threshold effects of time in operation.

Policy and Program Implications

Caution should be used when assessing the findings from this study for program and policy implications on Kentucky Drug Court. The statistics used were very powerful, resulting in very small relationships and small changes in the odds of graduating being statistically significant. The most relevant example of this is for the relationship between age and completion outcomes. Of the variables that were meaningfully related to drug court completion outcomes, age showed the strongest relationship in bivariate analyses yet this relationship is considered small when examining the effect size (r =.216). Age was also considered the most important predictor in contributing to model performance, evidenced by first entry in the forward entry stepwise models. Moreover, bivariate correlations between other variables under study and completion outcomes showed that some variables were statistically significant but the size of the relationships were so small that they were not practical for further analyses.

Since the top predictors were generally stable across all the analyses, Kentucky Drug Court could focus more detailed analysis efforts on those areas related to age, education, carrying charges related to the administration of justice , the number of sanctions, and sanctions involving incarceration. Kentucky Drug Court already frames programming around many of these factors. Examining these areas to determine the exact nature of the relationship to outcomes and subsequently, how programming could be modified to address them, should be not be overly difficult. Theory can be useful for explaining the observations, which is why theory is vitally important to program operations and why the lack thereof in drug court research is a concern. If age is the factor and the "why" is social capital and social bonds, programming and policy ought to

focus on those things that influence social capital and social bonds. There could be a number of reasons why younger participants would have more difficult time completing the program, for example finding a job when they have few job skills, displaying a poor attitude, or having difficulty with transportation. A focus on education, job skills training, mass transit familiarization, car pooling, or even drug court mentoring programs could be solutions. The same reasoning could apply to marital status and education. Drug courts could focus attention on interpersonal relationships by encouraging prosocial relationships and formal education. Kentucky Drug Court shows evidence of already considering these types of factors. The "drug court divorce" mentioned previously is an example of discouraging a "low" quality bond with known antisocial individuals. Additionally, formal education requirements are already built into Kentucky Drug Court requirements.

Drugs of choice, charge types, and sanctions appear to be wrapped around the concept of risk. This is not a new finding for the corrections discipline. Probation and parole organizations have attempted to gauge level of risk using various measures, for example the Level of Service Inventory-Revised (LSI-R). The LSI-R shows predictive capability for drug court (see Shaffer, 2010), and Kentucky Drug Court should consider a criminal risk measure as part of their intake procedures in addition to the Addiction Severity Index. Kentucky Drug Court should also consider entering this information into the management information systems and make it available for future studies. This may aid in the selection and screening process to eliminate individuals with criminal histories or social circumstances the drug court may have difficulty supporting.

Drug court staff should address sanctioning practices and data entry of sanctions. It is no surprise that the more sanctions one receives, the less likely graduation. That receiving a sanction of incarceration translates into worse outcomes is also not a surprise. If the "why" of this finding suggests data entry bias, then the data lacks reliability and is not valid as a measure of all sanctions. If however, sanctions involving incarceration are generally reliable at data input, but measure official response to severe non-compliance, then the findings suggest that jail may not be an effective deterrent for this population. Maybe those participants who receive a jail sanction are more risky than participants who do not receive a jail sanction or perhaps this type of sanction is not effective at forcing compliance. If so, program non-compliance should be addressed in some way other than jail or home detention. Treatment, for example, could be a viable alternative, but this too could confuse the purpose of the action, as quite possibly punishing someone with treatment may not "feel" like punishment. Further study is needed in this area.

Framing programming around the drug court variables studied in this research could be problematic. Drug court cannot change the length of time it has been in operation and cannot change the track through which a participant enters drug court. However, drug court staff can try to be mindful to changes over time in the management of participants and mindful of the varying needs for participants between those on probation and diversion. Perhaps by tracking their sanctioning behaviors, monitoring stock and flow rates through the program, and assessing outcomes a program can identify successful strategies for helping participants reach graduation.

Limitations

Although this study found significant predictors of program completion outcomes, the study suffers from several limitations. First, the variable selection process eliminated potentially important variables. In this study, sex and race were eliminated from multivariate analyses for the tests of hypotheses, as they failed to show a meaningful relationship to graduation. However, both race and gender are often found related to drug court outcomes, leaving their absence in the multivariate model questionable. When entered into a full forward stepwise model, Model IV, race and seven other variables emerged as important predictors. When using bivariate tests of relationship alone, valuable information on underlying phenomenon affecting completion outcomes is missed and resultant programming or policy changes potentially misguided. On the other hand, the variable selection was necessary to reduce the amount of noise and build the most parsimonious model (Menard, 2010), which is evidenced in this study as the two drug court variables were problematic and increased standard errors when using all variables without regard to variable selection.

The power of the statistics is also a concern. The statistics in this study were very powerful, finding even trivial relationships and differences statistically significant. If not careful, basing operational decisions on statistical significance alone may translate into wasted resources. To accommodate the very large sample size, considerations of effect size supplemented tests of statistical significance for variable selection. Even after using statistical significance in combination with the effect size for variable selection, small changes in the odds ratios were statistically significant. Modifying program features or

rewriting policy would not be wise if the problems it was designed to solve were quite small and only affected a small segment of the population.

Uneven group size in the dependent variable is another potential limitation. Seventy percent of the total population under study failed to complete drug court, leaving 30% in the category for graduation. Across all models, the percent correctly predicted for graduates was between 35.6% and 42.2% while percent correctly predicted for non-graduates ranged between 89.9% and 91.0%. With significantly more observations, the ability of the statistics to detect relationships increases, thus lending to better prediction for non-graduates.

Several limitations related to the variables exist. Kentucky Drug Court allows for multiple drugs of choice to be entered and does not indicate which one is most problematic. As a result, there is no way of knowing whether a listed drug of choice was casually used (drug abuse) or if the drug caused significant life problems due to trying quit or trying to continue use (drug addiction). Moreover, potentially important variables such as a measure of risk, employment and the presence of mental illness were not included in the study. These variables, either directly or indirectly, may be important to understanding completion outcomes as discussed in the literature review. Place or location may also play an important role in drug court, but was not included as part of this study. Parts of eastern Kentucky lie in an area identified as a high intensity drug trafficking area. It is possible that, across the entire state, certain places have significantly different patterns for drugs of choice or charge types, for example. This would suggest that program needs may also vary.

Future Studies

Drug courts are unique to their operating environments and therefore research on the geography of drug courts would be a useful addition to the literature. The current study assumes spatial continuity of the findings across the entire state. What drug court outcomes look like for drug courts located in the high intensity drug trafficking area will be of interest for Kentucky Drug Court leadership. Do these drug courts experience worse outcomes? Are drugs of choice the same across the state? Exploring regional variation in strongest predictors of outcomes would be a useful addition to the drug addiction and geography literature.

Future studies for drug court outcomes should include a general measure of risk, such as gained through the use of the LSI-R. As found in this study, drugs of choice, charge type, and sanctions appear to center around the concept of risk. Developing a risk profile or some construction of a risk indicator would allow researchers to tease out the effects of demographic and program progress variables on completion outcomes while controlling and assessing level of risk.

Future direction in drug court research could also include the use of data mining methods. The results in this study show that identifying drug court completion outcomes is not a straightforward and simple task and highlight the importance of moving beyond traditional bivariate tests of relationships and a priori identification of meaningful predictors. Future research on drug court outcomes should include robust techniques that are capable of identifying interaction effects among predictor variables and compensating for unbalanced group sizes in the dependent variable. Such methods may uncover previously unidentified relationships and be a useful addition to the literature. In this

manner, identifying factors related to completion outcomes would serve as the grounding point for future study or theory development. Alternatively, these results also highlight the need to move cautiously toward these data mining methods, as the models produced by including all variables, even those with trivial or no bivariate relationships, can be noisy and poor fitting.

Summary

The core criticisms of drug court as a correctional program surround a few key issues. First, many authors argue that it was founded without theoretical justifications. Second, drug courts scope widened over the years. Lastly, the number of drug courts quickly rose in the absence of quality assessments. Placed in the wider context of crime and criminality, this study offers a theoretical base for Kentucky's Drug Court, although theory generation was not the purpose of this study. Considering the findings in this study and Kentucky Drug Court's operations, the theory that could support why traditional correlates of crime are found related to drug court outcomes and why drug courts may be a useful correctional program is Sampson and Laub's (1993) social bond theory; the salient concepts being social capital and turning points. Drug court takes individuals who are on a path of criminality and attempts to redirect. Kentucky Drug Court programming attempts to redirect by supporting, encouraging, and in some cases requiring the generation of turning points. These include, but are not limited to, completing high school, getting a job, becoming engaged in prosocial activities and surrounded by prosocial peers, and getting and staying sober.

The lack of underlying theory may have contributed, at least partially, to the second criticism, that the scope of drug courts target population widened. Drug courts

were initially designed as a diversionary program for the low risk drug offenders, but as evidenced in Kentucky Drug Court, now frequently serve those who may be higher risk and probationers. This study focused on only felony drug court. Kentucky also runs misdemeanor drug courts, which generally follow very similar programming as the felony drug courts. These two populations are treated very differently by justice policies but within drug court, they are managed the same.

Criticisms on the lack of quality assessments and drug court research in general center on lack of statistical rigor, data quality, units of measure, small sample sizes, and time frames. This current study, although including multiple indicators of statistical significance, suffered from issues with data quality and units of measure. These issues, however, may stem from the fact that Kentucky Drug Court management information system was designed for operational purposes, not necessarily for the express purpose of supporting scholarly research. This study utilized a large number of observations captured from a period spanning three years. A greater number of observations is generally a more desirable situation than statistical analysis with few observations, however, caution must be used in these circumstances as small and trivial relationships are statistically significant. Small and trivial, yet statistically significant relationships between the predictors and also between the predictors and the outcome adds complexity and noise in statistical models.

Considering that drug courts are popular and continue to grow in number despite of lack of quality assessments, perhaps we are seeing a shift in the way criminal justice policy makers perceive the role of punishment. The body of literature on drug court, including the works critical of drug court suggests this: judicial leadership, relying on

instinct and experience rather than scholarly education, came up with a good idea and acted upon it. It "worked." Others saw that it "worked" and the idea grew unconstrained and without proper strategic guidance and planning. However, the results from this study and others like it potentially confirm the instincts of judicial leadership—that something other than jail and prison could move an individual out of a criminal trajectory. Over time, however, as drug court grew in popularity and in number, it also grew is scope and began serving other types of offenders for which it never intended to serve (i.e., high risk and probationers). Placing drug court in a proper theoretical perspective will allow for a more clear and attainable strategic plan, support the development of measurable goals, and allow drug court leadership to manage program scope.

Scope-creep withstanding, many drug court researchers and practitioners assert that drug courts "work" for this more risky population too. As the numbers of traditional drug courts and other specialized drug courts continue to grow, and, as with Kentucky Drug Court, misdemeanor and felony level participants are managed much the same, perhaps criminal justice scholars and policy makers need to take a pause and think through how, why, and who we punish. Discussions on the purpose of punishment, what, and who society is actually punishing, and if some people or some acts are more or less deserving of punishment, need to be reinvigorated.

APPENDICES

Appendix A
Key Studies Matrix

Table A1
Key Drug Court Completion Outcome Studies

Author	Year	Sex	Age	Race	Marital Status	Employed	Education	Drug of Choice	Criminal Historv	Family & Social	Mental Illness
Anspach, Ferguson & Phillips	2004	x	x			x	x	x	x		
Boles et al.	2007	x	x	x		x	x	x		x	x
Butzin, Saum & Scarpetti	2007	x	x	x	x	x	x	x			
Evans, Li & Hser	2009	x	x	x		x	x	x	x	x	x
Hepburn & Harvey	2007	x	x	x	x	x	x		x		
Hickert, Boyle, & Tollefeson	2009	x	x	x	x	x	x	x	x	x	x
Hiller, Knight & Simpson	1999	x	x	x	x	x	x	x	x		
Marlowe et al.	2003	x	x	x	x	x	x	x			
Mullaney & Peat	2008	x	x	x	x	x	x	x	x	x	
Peters, Haas & Murrin	1999	x	x	x	x	x	x	x	x		
Schiff & Terry	1997	x	x	x	x		x	x			
Sechrest & Shicor	2008	x	x	x		x	x	x	x	x	
Senjo & Leip	2001	x	x	x	x		x			x	
Shaffer et al.	2010	x	x	x	x	x	x	x	x		

Appendix B
Variable Recoding

Table B1
Race: Recoding

Original Value	(N)	Current Value
Alaskan Native	3	Non-White
Asian or Pacific Islander	3	Non-White
Bi-Racial	19	Non-White
Black/African American	423	Non-White
Hispanic- Mexican	8	Non-White
Hispanic-Other	4	Non-White
Native American	6	Non-White
Other	31	Non-White
Unknown	27	Non-White
White	2973	White

Table B2

Original Value	(N)	Current Value
Divorced	599	Not married
Married	673	Married
Never Married	922	Not married
Null	147	system missing
Other	24	system missing
Separated	206	Not married
Single	895	Not married
Widowed	31	Not married

Table B3

Education: Recoding

Original Value	(N)	Current Value
Adult Education	6	At least high school
Alternative School	4	At least high school
Associates Degree	5	At least high school
Completed 10th Grade	270	Less than high school
Completed 11th Grade	294	Less than high school
Completed 9th Grade	223	Less than high school
Day Treatment	1	system missing
Elementary School	79	Less than high school
GED	605	At least high school
Graduate	78	At least high school
High School	1142	At least high school
Home School	34	At least high school
Literacy Classes	1	system missing
Masters Degree	1	At least high school
Middle School	168	Less than high school
Not Applicable	3	system missing
Null	271	system missing
Some College	181	At least high school
Undergraduate	74	At least high school
Vocational	57	At least high school

Table B4

Original Value	(N)	Current Value
Alcohol	1,158	Alcohol
Amphetamine	121	Meth or other stimulant
Barbiturate	67	Sedatives
Benzodiazepine	842	Sedatives
Club Drugs	1	Other
Cocaine	995	Cocaine/Crack
Codeine	9	Opiates
Crack	3	Cocaine/Crack
Ecstasy	1	Other
Hallucinogen	9	Other
Heroin	44	Opiates
Hydrocodone	52	Opiates
Hydromorphone	5	Opiates
Inhalant	5	Other
Lortabs	1	Opiates
LSD	42	Other
Marijuana/THC	1,536	Marijuana
MDA	3	Other
MDMA (Ecstasy)	63	Other
Methadone	316	Opiates
Methamphetamine	606	Meth or other stimulant
Methaqualone	2	Opiates
Morphine	24	Opiates
Neurontin	3	Sedatives
Opiates	1,292	Opiates
OxyContin	410	Opiates
PCP	4	Other
Propoxyphene	3	Opiates
Ritalin	1	Meth or other stimulant
Soma	11	Sedatives
Stimulants	2	Meth or other stimulant
Suboxone	18	Opiates
THC	2	Marijuana
Ultram	12	Sedatives
Valium	1	Sedatives
Xanax	4	Sedatives

Table B5

Original Value	(N)
Sale of Simulated Controlled Substance	1
Illegal Sale/Give Alcohol, Dry Territory	2
Trafficking in Controlled Substance	457
Sell Controlled Substance to Minor	2
Conspiracy to Traffic in Controlled Sub	7
Advertising of Controlled Substance	1
Sell/Transfer Simulated Controlled Sub	5
Traffic in Controlled Substance/School	39
Manufacture Methamphetamine	67
Cultivation of Marijuana	38

Table B6

Charge Type Drug Possession: Recoding

Original Value	(N)
Possession -Drugs, Cont Substance	1,478
Possession -Drug Paraphernalia	679
Prescription Drugs Not in Proper Container	66
Knowing Possess/Tamper ANHYD Ammonia in Unapproved Container	20
Controlled Substance Endangerment to Child	1

Table B7

Charge Type Vehicle/Traffic: Recoding

Original Value	(N)
Speeding	11
Failure to use or Improper Signal	4
Coasting - Car Out of Gear on Down Grade	1
Disregarding Stop Sign	10
Reckless Driving/Careless Driving	14
Failure to Dim/Illuminate Headlights, None	5
Following Another VEH Too Closely	1
Rear License Not Illuminated	4
Vehicle a Nuisance, Noisy, Etc.	1
Improper Lane Usage/Vehicles Keep to Right	1
No/Expired/Revoke/Suspended License or Registration/Transfer	131
Possess Open Alcohol Beverage in Motor VEH	5
Failure to Maintain/Provide Insurance	38
Failure to Wear Seat Belts	10
Failure to Report/Leave Scene Traffic Accident	8
Failure to Comply w/ Personal Protective Equipment Laws	6

Table B8

Original Value	(N)
Fleeing or Evading Police	75
Failure to Appear	1
Violation of Condition Of Release	1
Failure to Comply With Sex Offender Reg	1
Bail Jumping	3
Shock Probation	9
Escape	36
Falsely Reporting an Incident	1
Hindering Prosecution or Apprehension	2
Contempt of Court	45
Non-Payment Of Fines	14
Promoting Contraband	40
Probation/Parole Violation	314
False Statements, Concealment of Facts, False Information, Perjury	18
Bail Jumping	16
Tampering With Physical Evidence	80
Intimidating/Tampering A Participant In Legal Process	3
Unlawful Access to Computer	1
Felon In Possession of Firearm/Handgun	22

Table B9
Charge Type Public Order: Recoding

Original Value	(N)
Criminal Mischief	53
Carrying a Concealed Deadly Weapon	10
Possession of Defaced Firearm	1
Prostitution	3
Possession of Alcoholic Beverage By Minor	3
Public Intoxication	89
Disorderly Conduct	14
Harassing Communications	1
Resisting Arrest	33
Criminal Trespass	31
Nuisance Through Accumulation of Rubbish/ Littering	4
Loitering	5

Table B10

Charge Type Crimes Against a Person: Recoding

Original Value	(N)
Aggravated Assault	3
Wanton Endangerment	48
Assault	30
Assault-Domestic Violence	15
Menacing	3
Terroristic Threats	8
Sexual Misconduct	2
Endangering The Welfare of a Minor	11
Exploit an Adult	6
Unlawful Transaction W/Minor-3rd Degree	7
Cruelty to Animals	1
Violation E.P.O./D.V.O.	4
Manslaughter	1
Reckless Homicide	3
Kidnapping-Adult	1
Custodial Interference	2
Robbery	16
Criminal Abuse/Unlawful Trans W/Minor	18
Stalking	2
Theft of Identity	23
Flagrant Non Support/Abandonment Minor	69

Table B11

Charge Type Property: Recoding

Original Value	(N)
Forgery	54
Criminal Possession of Forged Instrument	236
Tampering With Public Records	1
Theft of Services	2
Receiving Stolen Property	154
Possession of Burglary Tools	12
Possession or Use of Radio That Sends/Receives Police	1
Arson	6
Welfare Fraud	11
Burglary	212
Theft by Unlawful Taking/Deception	457
Theft of Controlled Substance	114
Theft of Motor Vehicle Registration	2
Fraudulent Use of Credit Cards	60

Table B12
Charge Type: DUI Recoding

Original Value	(N)
Operate Moving Vehicle While Impaired Alcohol/ Drugs/etc.	211

Table B13
Sanctions: Recoding

Original Value	(N)	Current Value
Additional Assignments	442	Increase Program Elements
Community Service	1,881	Community Service
Detention	3,343	Detention or Incarceration
Earlier Curfew	248	Increase Program Elements
Failure To Appear Warrant	341	Other
Home Detention	25	Detention or Incarceration
Home Incarceration	109	Detention or Incarceration
Incarceration	4,162	Detention or Incarceration
Increase Drug Tests	82	Increase Program Elements
Increase Level of Treatment	125	Treatment or treatment related
Increase Self-Help Meetings	844	Treatment or treatment related
NULL	129	system missing
Other	722	Other
Phase Demotion	393	Demotion or Suspension
Residential Treatment	254	Treatment or treatment related
Suspension	127	Demotion or Suspension
Suspension	127	Demotion or Suspension

Appendix C
Tests of Relationships

Table C1

Correlation Matrix: Participant Characteristics

Variable		Completion Outcome	Race	Sex	Marital Status	Age	Education Level
Completion Outcome	Pearson's *r*	1					
	Sig.						
	N	3,497					
Race	Pearson's *r*	.072**	1				
	Sig.	.000					
	N	3,497	3,497				
Sex	Pearson's *r*	-.047**	-.102**	1			
	Sig.	.005	.000				
	N	3,497	3,497	3,497			
Marital Status	Pearson's *r*	.101**	.078**	-.083**	1		
	Sig.	.000	.000	.000			
	N	3326	3326	3326	3326		
Age	Pearson's *r*	.216**	-.086**	-.061**	.170**	1	
	Sig.	.000	.000	.000	.000		
	N	3,497	3,497	3,497	3326	3,497	
Education Level	Pearson's *r*	.150**	.073**	-.012	-.025	.108**	1
	Sig.	.000	.000	.504	.160	.000	
	N	3221	3221	3221	3135	3221	3221
Number Drugs of Choice	Pearson's *r*	-.119**	.060**	.032	-.062**	-.102**	-.050*
	Sig.	.000	.002	.093	.001	.000	.011
	N	2728	2728	2728	2650	2728	2608
Any Meth or other Stimulant	Pearson's *r*	.117**	.155**	-.005	.008	.030	-.018
	Sig.	.000	.000	.751	.654	.072	.295
	N	3,497	3,497	3,497	3326	3,497	3221
Any Cocaine	Pearson's *r*	-.054**	-.114**	-.032	-.071*	.120**	.000
	Sig.	.002	.000	.056	.000	.000	.978
	N	3,497	3,497	3,497	3326	3,497	3221
Any Marijuana	Pearson's *r*	-.047**	-.076**	.152**	-.079**	-.161**	-.049**
	Sig.	.005	.000	.000	.000	.000	.006
	N	3,497	3,497	3,497	3326	3,497	3221
Any Opiate	Pearson's *r*	-.064**	.248**	-.051**	.047**	-.106**	-.002
	Sig.	.000	.000	.003	.000	.000	.906
	N	3,497	3,497	3,497	3326	3,497	3221
Any Alcohol	Pearson's *r*	-.034*	-.076**	.110**	-.076**	.038*	-.003
	Sig.	.046	.000	.000	.000	.024	.854
	N	3,497	3,497	3,497	3326	3,497	3221

Table C1 *(continued)*

Variable		Completion Outcome	Race	Sex	Marital Status	Age	Education Level
Any Sedative	Pearson's *r*	-.046**	.124**	-.039*	.008	-.122**	-.068**
	Sig.	.006	.000	.022	.626	.000	.000
	N	3,497	3,497	3,497	3326	3,497	3221
Any Other Drug of Choice	Pearson's *r*	-.030	-.027	.034*	-.060**	-.056**	-.022
	Sig.	.080	.111	.044	.000	.001	.203
	N	3,497	3,497	3,497	3326	3,497	3221
Number of Charges	Pearson's *r*	-.016	.011	.038*	-.024	-.014	.047*
	Sig.	.395	.572	.042	.205	.463	.016
	N	2826	2826	2826	2685	2826	2607
Any Sale, Trafficking, Manufacturing	Pearson's *r*	.119**	-.010	.022	.068**	.063**	.012
	Sig.	.000	.546	.189	.000	.000	.476
	N	3,497	3,497	3,497	3326	3,497	3221
Any Vehicle or Traffic	Pearson's *r*	-.010	-.027	.036*	-.013	-.009	.013
	Sig.	.547	.112	.033	.467	.576	.449
	N	3,497	3,497	3,497	3326	3,497	3221
Any Drug Possession	Pearson's *r*	.102**	-.116**	.026	-.016	.101**	.006
	Sig.	.000	.000	.118	.358	.000	.737
	N	3,497	3,497	3,497	3326	3,497	3221
Any Admin of Justice	Pearson's *r*	-.135**	-.036*	.031	-.026	-.048**	-.015
	Sig.	.000	.035	.068	.138	.004	.399
	N	3,497	3,497	3,497	3326	3,497	3221
Any Public Order	Pearson's *r*	-.035*	.002	.033*	-.031	-.073**	-.007
	Sig.	.038	.891	.048	.070	.000	.674
	N	3,497	3,497	3,497	3326	3,497	3221
Any Crime Against a Person	Pearson's *r*	-.055**	-.016	.002	-.020	.024	-.010
	Sig.	.001	.330	.924	.224	.155	.580
	N	3,497	3,497	3,497	3326	3,497	3221
Any Property	Pearson's *r*	-.132**	.075**	-.035*	-.026	-.105**	-.017
	Sig.	.000	.000	.040	.128	.000	.329
	N	3,497	3,497	3,497	3326	3,497	3221
Any DUI	Pearson's *r*	.048**	.054**	.020	-.038	-.037*	.027
	Sig.	.005	.002	.248	.028	.029	.132
	N	3,497	3,497	3,497	3326	3,497	3221
Track	Pearson's *r*	-.101**	-.131**	.052**	-.034*	.101**	-.011
	Sig.	.000	.000	.002	.049	.000	.550
	N	3484	3484	3484	3313	3484	3209

Table C1 *(continued)*

Variable		Completion Outcome	Race	Sex	Marital Status	Age	Education Level
Months Program in Operation	Pearson's *r*	-.100**	-.315**	.039*	-.111**	.073**	-.094**
	Sig.	.000	.000	.020	.000	.000	.000
	N	3,497	3,497	3,497	3326	3,497	3221
Time in Program	Pearson's *r*	.538**	.028	-.037*	.085**	.192**	.090**
	Sig.	.000	.093	.027	.000	.000	.000
	N	3,497	3,497	3,497	3326	3,497	3221
Number of Sanctions	Pearson's *r*	-.166**	.014	.033	-.070**	-.138**	.009
	Sig.	.000	.401	.055	.000	.000	.622
	N	3,497	3,497	3,497	3326	3,497	3221
Any Incarceration Sanction	Pearson's *r*	-.165**	-.004	.020	-.032	-.104**	.026
	Sig.	.000	.817	.226	.064	.000	.136
	N	3,497	3,497	3,497	3326	3,497	3221
Any Treatment Sanction	Pearson's *r*	-.084**	-.024	.020	-.033	-.066**	-.010
	Sig.	.000	.160	.229	.055	.000	.573
	N	3,497	3,497	3,497	3326	3,497	3221
Any Community Service Sanction	Pearson's *r*	-.020	.045**	.019	-.051**	-.095**	.033
	Sig.	.227	.008	.260	.003	.000	.059
	N	3,497	3,497	3,497	3326	3,497	3221
Any Suspension or Demotion	Pearson's *r*	.006	.051**	-.009	-.007	-.026	.056**
	Sig.	.742	.002	.591	.694	.125	.001
	N	3,497	3,497	3,497	3326	3,497	3221
Any Increased Program Elements	Pearson's *r*	.032	.073**	-.034*	-.015	-.024	.014
	Sig.	.061	.000	.044	.380	.160	.431
	N	3,497	3,497	3,497	3326	3,497	3221
Any Other Sanction	Pearson's *r*	-.108**	.019	-.008	-.037	-.061**	-.049**
	Sig.	.000	.264	.651	.032	.000	.005
	N	3,497	3,497	3,497	3326	3,497	3221

*$p < .05$; **$p < .01$

Table C2

Collinearity Statistics

Variable	Tolerance	VIF
Sex	.924	1.082
Age*	.765	1.307
Race	.762	1.313
Marital status*	.918	1.090
Education*	.945	1.059
Number drugs of choice**	.093	10.810
Meth or other stimulant*	.473	2.116
Cocaine/crack	.456	2.193
Marijuana	.464	2.153
Opiate	.338	2.955
Alcohol	.454	2.201
Sedative/downer	.420	2.379
Other	.698	1.432
Number charges	.414	2.415
Drug sale/traffic/manu*	.549	1.820
Drug possession*	.338	2.961
Vehicle/traffic	.727	1.375
Admin justice*	.714	1.400
Public order	.803	1.245
Person	.759	1.318
Property*	.371	2.693
DUI	.744	1.344
Number of sanctions*	.371	2.936
Any incarceration*	.711	1.407
Any treatment sanction	.739	1.354
Any community service	.724	1.382
Any suspension sanction	.853	1.172
Any increase program	.761	1.314
Any other sanction*	.824	1.213
Track	.910	1.099
Months in operation*	.788	1.269
Time in program	.801	1.249

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